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Through the Screen. Towards a Philosophical Mediology.

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“Who's to say which is which?”.
— The Mad Hatter

“The question is, which is to be master — that’s all”.
— Humpty Dumpty

(Lewis Carroll – Through the Looking Glass)

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Introduction

Philosophy is now commonly understood as an academic discipline that belongs to the departments of *humanities*. Of course, it often collaborates with the social sciences, or even the natural sciences, maintaining the *daimonic* and interstitial status accorded to its origins. But, in any case, it is understood as a *human* discipline.

Human, all too human, some might say. Expressing what is implicit in the first definition given by the Cambridge Dictionary, we would obtain that philosophy is «the use of *human* reason in understanding such things as the nature of the real world and existence *(as perceived by humans)*, the use and limits of *human* knowledge, and the principles of *human* moral judgment»[1]. Although in its early days philosophy was a sort of general system of knowledge, today it seems to be able to deal with only one particular object: *the human being* (and its various, very human activities).

1. Beyond the human?

Reactions to this excess of humanism in philosophy have certainly not been lacking. From post-structuralism, through post-humanism, to trans-humanist currents, several authors have made overcoming the anthropocentric perspective their aim[2].

Among the first currents that have really and radically challenged the anthropocentric privilege of philosophy is *post-structuralism*[3]. It criticizes above all the ontological and epistemological privilege attributed to subjectivity, as well as the very unity of the subject. This criticism, of Nietzschean derivation, does not, however, abandon human subjectivity as an object of research: it, more than anything else, overturns a number of issues. Post-structuralism, in fact, dedicates

1 Retrieved from: https://dictionary.cambridge.org/it/dizionario/inglese/philosophy (accessed 20 March 2020). Words in italics are my additions.

2 Far from believing that the whole of modern philosophy first, and then post-Kantian philosophy, has always placed the human being at the center of the cosmos, here one simply wants to note how the dominant paradigm in the human sciences has long remained that of *anthropocentric privilege*. Then it is certainly possible to trace a line of thought, consisting also of some authors who are not at all secondary, who, even before or independently of the anti-anthropocentric currents taken into consideration here, have dedicated their reflection to the themes of nature, immanence, the processuality of being, in a radically anti-humanistic and non-moralistic key. For a reconstruction of this line of thought, described almost as a sort of parallel history of philosophy, see R. Ronchi, *Il canone minore. Verso una filosofia della natura*, Feltrinelli, Milano 2017.

3 Under the label of post-structuralism can be included several important authors such as Barthes, Derrida, partly Foucault, Deleuze and Guattari, Baudrillard, and others. It would be both verbose and superfluous to recall the main works of this variegated current, but if one wants to identify two very influential texts, published in the same year (1967), that marked the path and laid the foundations of deconstructionism (one of the most important outcomes of the post-structuralist research), then R. Barthes, *Elements of Semiology*, tr. en. A. Lavers, C. Smith, Hill&Wang, New York 1997 and J. Derrida, *Writing and Difference*, tr. en. A. Bass, Routledge, London-New York 2001 can be indicated.

itself to the analysis of symbolic forms, languages, discursive regimes, considering them constitutive of subjectivity, rather than a result of it: subjectivity is not a unitary substance, of which language or the capacity for symbolization are attributes, but rather the opposite is true, namely that what is commonly called "subject" actually resembles a mosaic composed of as many *tesserae* as there are *historically and materially determined* forms of symbolization, language, etc. that constitute it. For post-structuralism, in short, the subject is not a starting point, but it can well be considered a point of arrival.

If post-structuralism proposes to dismantle the supposed privilege of the human being in order to study it from a neutral position – provided that a human being can assume such a position – *post-humanism*[4] and *trans-humanism*[5] propose instead a much more performative task: assuming that there are or will be technologies capable of doing what human beings do, but better, such philosophical movements aim at *improving* the human being through such technologies. According to these currents nature is not given once and for all, so neither is the human condition: it can be overcome. Even the overcoming of the human being, however, is always understood as an *improvement*: an integration with technological components that will help the human being to perceive itself no longer as separate, but as interconnected to every non-human being (post-human); or a potentially infinite expansion of its consciousness freed from the flesh, its power, and its knowledge (trans-human). Rather than anti-humanism, it seems that in these cases it is possible to speak of a *new and empowered humanism*, which aims to overcome the weak human condition in the direction of a stronger and more perfect hybrid condition, of communion between human and technology.

Finally, there are philosophical currents that insist on the impersonal[6] and

4 Actually the term "post-human" has no univocal meaning at all and can be understood in different senses, ranging from criticism to traditional concepts of humanism or human nature to the voluntary extinction of the human species, passing through those philosophical theories that study the implications of an extension of the moral concept of subjectivity to non-human (natural or artificial) species (cf. F. Ferrando, *Posthumanism, Transhumanism, Antihumanism, Metahumanism, and New Materialisms. Differences and Relations*, in «Existenz», Volume 8, No 2, Fall 2013, pp. 26-32). The term post-humanism, however, will be used here mainly in the sense of technological post-humanism and, in particular, in reference to the concept of *cyborg* elaborated by Donna Haraway (cf. D. Haraway, *A Cyborg Manifesto. Science, Technology, and Socialist-Feminism in the Late Twentieth Century*, Routledge, London-New York 1991) and the implications it has in the paradigm shift towards a subjectivity no longer linked to biological bodily limits, in which corporeality itself, and not only interiority, is seen as a field of inscriptions of socio-cultural codes that determine it.

5 The term trans-humanism (abbreviated as H+) refers to an ideology that advocates the transformation and enhancement of the human condition through the development of technologies, particularly computational technologies. The version of trans-humanism referred to here is mostly that of R. Kurzweil, *The Singularity is Near. When Human Transcends Biology*, Viking, New York 2005.

6 As for impersonalism as a *political* philosophy rejecting the concept of "person", see R. Esposito, T. Campbell, *For a Philosophy of the Impersonal*, in «CR: The New Centennial Review», Vol. 10, No. 2, *New Paths in Political Philosophy* (fall 2010), pp. 121-134 (in Italian remains fundamental R. Esposito, *Terza persona. Politica della vita e filosofia dell'impersonale*, Einaudi, Torino 2007). The reflection on the impersonal in politics was triggered by George Bataille in reference to the *impersonal objectivity* of power and *collective impersonality*. (cf. G. Bataille, *La souveraineté*, Lignes, Paris 2012). In more recent times the reflection on the dimension of coexistence and the non-priority of the "I" over the "we" has been carried out by Jean-Luc Nancy: see, in this respect *Being Singular Plural*,

part of them return to the *philosophy of nature*[7]. These are perhaps the most radically anti-anthropocentric, but they neglect, on the one hand, the role of techniques and technology (well emphasized instead by the lines of thought examined above), considering them part of the human world and of its will to dominate nature; on the other hand, they risk leading to an anti-humanism that completely neglects (if not emphasizes its negative role) the contribution of the human component in systemic interactions.

As can be seen, then, even most anti-anthropocentric perspectives, positively or negatively, do not seem to be able to avoid the central reference to the human being. The fundamental question of philosophical anthropology therefore seems inescapable. Even in this work, then, even in a text that deals mostly with media, interfaces, and screens, I feel I have to start from here: from a confrontation with philosophical anthropology. Before any further reflection, should its question be answered? Or will it be possible to bypass it and overcome it? If so, in which direction?

2. Philosophical anthropology.

Philosophical anthropology is based on the fourth and most fundamental Kantian question: *what is the human being?*[8] The Copernican revolution of thought in Kant is the somewhat "reactionary" move that leads philosophy to a strategic withdrawal from the field of science and technology that allows it to elevate itself to human science *par excellence*. The scientific revolution has removed the human being from the center of the universe, the philosophical revolution has placed him at the center... of the human world.

It seems obvious, but it is not at all: the birth of modern philosophical anthropology raises the human being to the subject and object of thought at the same time, dissolves every other kind of philosophical speculation in a thought about the human being, dissolves philosophy itself in philosophical anthropology. All the philosophical undertaking can be summed up in the enterprise of humanity that thinks itself[9]. This would seem rather harmless, were it not for the more or less

tr. R. Richardson, A. O'Byrne, Stanford University Press, Stanford 2000 and, in particular, the essay *On Being Singular Plural*, pp. 1-101.

7 With regard to a recent approach to the philosophy of nature, see E. Coccia, *The Life of Plants. A Metaphysics of Mixture*, tr. D.J. Montanari, Polity, Cambridge 2018.

8 The four Kantian questions, the answer to which, according to Königsberg's philosopher, represents the indispensable task of critical philosophy, are: *What can I know?* (*Was kann ich wissen?*); *What do I have to do?* (*Was soll ich tun?*); *What can I hope for?* (*Was darf ich hoffen?*); *What is the human being?* (*Was ist der Mensch?*). The first is the metaphysical or epistemological question, the second is the one that founds ethics, while the third concerns the religious dimension. If I define the fourth as the most important, however, it is because Kant himself claims that, after all, «the three first questions refer to the last one» (*Log.*, Ak., Bd. IX 25; I. Kant, *Logic*, tr. J. Richardson, W. Simpkin and E. Marshall, London 1819, p. 30).

9 Obviously, several exceptions and thinkers can be identified that cannot be traced back to this paradigm. The most important of all is undoubtedly Hegel, for whom it could be said, rather, that philosophy is nothing more than the history of being intent on *thinking* about itself and, therefore, on *realizing* itself. Although Hegelian philosophy moves on this trajectory definitely more "objective" than Kantian subjectivism, it cannot be overlooked the fact that, even in it, the apex of the realization of being is found precisely in its re-comprehension through philosophy (Hegel's philosophy, in particular), which is inevitably instantiated by human thinking

concealed presumption that the human world represents the summit of the world itself.

To the fundamental question of philosophical anthropology, legions of thinkers have tried to answer in various ways, but their attitudes are often ascribable to the search for a *specific difference*. This *difference* of the human being is treated above all in relation to the animal world[10] and the theorists of difference are mainly divided into two apparently opposing strands.

The first line of thought is the explicitly anthropocentric one, which considers *the human being as the vertex of nature*. We can ascribe Scheler[11] or Plessner[12] to this school. According to the former, human being is different (and superior) to the animal in that, unlike the latter, it is able to distance itself from reality and, thanks to this movement, to really grasp reality in its fullness. According to the second, on the other hand, human beings are not only able to distance themselves from the world, but also from themselves, and this would be precisely the movement of thought that allows self-consciousness (which also according to Scheler represented the summit of natural evolution).

The second line, instead, is the one that recognizes in *the extraneousness of the human being to the world* its specific difference. This concept of extraneousness is, actually, also found in the aforementioned Plessner, under the name of *eccentricity*. In general this conception, which has found followers over the centuries, from Lucretius[13] to Anders[14], says that the human being is by nature unsuitable for any environment, weak, naked and, despite this, has managed to survive, developing intelligence, abstraction skills, and technique. On closer inspection, even this thesis is nothing more than a masked anthropocentrism: starting from its own ontological

individuals.

10 The plant world is not even considered by philosophical anthropology, since, the dominant perspective, even in the life sciences, is the *zoocentric* one (cf. E. Coccia, *The Life of Plants*, cit.): the human being is a superior animal, but still an animal; therefore, for it to be placed at the top of the life-chain, it is necessary to assume that complex animals are by nature superior to any other form of life, and therefore also to the vegetal form. This representation of nature as an ascending scale from lower forms to human beings is of Aristotelian origin and was fixed in the collective imagination of the natural sciences by Carl Nilsson Linnaeus and his binomial classification. But, in fact, it should be considered by now as established, thanks to advances in biology, that there are no "superior" or "inferior" forms of life, but simply different forms: plants are «equipped with sense abilities, even greater than those of animals» (S. Mancuso, *La nazione delle piante*, Laterza, Roma-Bari 2019, p. 115, my translation), but they cannot move; this implies, for the plants, the need to «solve problems, not being able to avoid them like animals» (*ibid.*, p. 116, my translation). Despite the limits of contemporary philosophies of nature, previously highlighted, it must be recognized that they represent a first antidote to anthropocentrism: undermining *animal chauvinism* (cf. J.L. Arbor, *Animal Chauvinism, Plant-Regarding Ethics and the Torture of Trees*, in «Australian Journal of Philosophy», 64.3 (1986), pp. 335–369), they also crumble the very pedestal on which the human being has placed itself.

11 Cf. M. Scheler, *The Human Place in the Cosmos*, tr. M.S. Frings, Northwestern University Press, Evanston 2009.

12 Cf. H. Plessner, *Levels of Organic Life and the Human. An Introduction to Philosophical Anthropology*, tr. M. Hyatt, Fordham University Press, New York 2019.

13 Cf. *De rerum natura*, II, 195-234; Titus Lucretius Carus, *On the Nature of Things*, tr. M. Ferguson Smith, Hackett, Indianapolis 2001, pp. 40-41.

14 Cf. G. Anders, *The Pathology of Freedom. An Essay on Non-Identification*, tr. K. Wolfe, in «Deleuze and Guattari Studies», Vol. 3, Issue 2, December 2009, pp. 278-310.

weakness, the human being has developed its own strength, standing, for better or for worse, as the ruler of nature.

In both cases the anthropological and cosmological issues are closely related: according to the metaphysics of the natural superiority of the human being, it *has* world, possesses it, governs it, and, at best, cures it, at worst, exploits it; according to the metaphysics of ontological weakness, instead, the human being *lacks* world, is alien to it, and must appropriate it, must conquer it.

Heidegger's position[15], in its ambiguity, could be considered a middle position: the starting condition of *Dasein* – the thrownness (*die Geworfenheit*) – is a position of weakness, yet the world can never be completely alien to *Dasein*, since *Dasein* is always being-in-the-world.

Although it is precisely Kant's fourth question that gave rise to modern philosophical anthropology, Kant's position[16] can be considered rather particular in this panorama: there is certainly, in his philosophy, a recovery of teleology and of the apical position of the human being in the scale of the living, but only in a moral perspective and, therefore, only in an *entirely human perspective*. This is because, in order to place itself at the top of the world understood as *cosmos*, that is, as *ordered totality*, the human being must have an *idea* of an ordered world, which, according to Kant, is indemonstrable on the theoretical level, but is postulated on the *practical* one. Simplifying the complexity of Kantian discourse, one could say that the human being can be considered the vertex of creation, but only *from the human point of view*.

The problem with the anthropology of specific difference is that, regardless of what difference is identified, for each living species a characteristic capable of standing out as a specific difference between that species and any other can be identified. As a result, it will be problematic to justify the shift from difference to superiority: even assuming that the human species is the only one capable of self-awareness, with what argument can one states that self-awareness is a quality superior to the ability to fly, to the ability to perceive and regulate itself according to chemical gradients, to orientation by ultrasound? With equal evolutionary success, how will it be possible to order an objective scale of living beings on the highest step of which to place human beings?

The Kantian scheme – if it were not for the fact that Kant postulates the universality of reason, which makes the postulate of a moral order so universal as well – would be less problematic as far as it is perspectivistic: the human being is at the top of the evolutionary scale from a human perspective. An even more radical potential for perspectivism, although never brought to its extreme consequences, also existed in the monadological theory of Leibniz[17]: ideas of the world or its representations may differ and simply represent different perspectives on the same

15 Cf. M. Heidegger, *Being and Time. A Translation of Sein und Zeit*, tr. J. Stambaugh, State University of New York Press, Albany 1996.

16 Although considering philosophical anthropology, the Kantian position in this field is not so much in the *Anthropology from a Pragmatic Point of View* (for some hints about teleology in this text see *ApH*, Ak., Bd. VII, 277-282; I. Kant, *Anthropology from a Pragmatic Point of View*, tr. R.B. Louden, Cambridge University Press, Cambridge 2006, pp. 178-182), but rather in *KU*, Ak., Bd. V, 359 ff.; Id., *Critique of Judgement*, tr. J.C. Meredith, Oxford University Press, Oxford 2007, pp. 187 ff.

17 Cf. L. Strickland, *Leibniz's Monadology. A New Translation and Guide*, Edinburgh University Press, Edinburgh 2014.

totality, whose objectivity is not sacrificed, but whose order does not exist, except from the perspective of the observer. It would be, by removing the unifying and total perspective of a supreme monad, an *acosmic realism*.

3. Constructing the world.

The already mentioned Günther Anders, although starting from the perspective of a specific difference, that is to say from the extraneousness of man to the world[18], nevertheless develops a conception of anthropology that is actually a destruction of it. Through a universalization of the phenomenon of *the will*[19], Anders affirms that the only way for human beings to deal with the contingency and indeterminacy of the world is *to act* and transform, or rather *to construct a world*.

This is a real destruction of the modern sense of philosophical anthropology, even though it has been achieved by carrying the principle of specific difference to its extreme consequences:

> Through this recourse to action, it is true that philosophical anthropology reaches the limits of its legitimacy, its capacities and its competence. From the point of view of what man does, the question 'what is he and who is he authentically?' seems wrongly posed. *For acting is not being*[20].

That of Anders is a moral answer to the anthropological question, an anti-essentialist answer to the question about the essence of the human being. Although it is Hegel who has posed the problem of *self-identification* with greater clarity, according to Anders, it is Kant that «treated the question as such and without any mask»[21]. As said above, although the fourth question is at the origin of modern philosophical anthropology, the Kantian answer can already be considered a partial overcoming, in a moralistic and perspectivistic direction, of the aforementioned anthropology:

> Self-identification through 'Aufklärung' and through the critique is an action for Kant: there is no question for him of observing [*constater*] what reason *is* (and for him it is equivalent to man), but of constituting it through the critical operation[22].

Action is what constitutes the human being in its human specificity, since *thought is also action*. The human being who acts builds itself and, at the same time, its own world, that is, a totality organized by and for it. The world exists as a world for the human being, a world from the human perspective, precisely because the human being organizes it with activity and thought, that is, with forms of its own action.

An anthropology (or non-anthropology) so understood – perspectivist, moral, focused on what the human being does, rather than on what the human being is – can no longer be anthropocentric: anthropology becomes the science through

18 Cf. G. Anders, *Une interprétation de l'a posteriori*, in «Recherches Philosophiques», 4, 1934-35, pp. 65-80.

19 Cf. Id., *The Pathology of Freedom*, cit., p. 305.

20 *Ibid.*, cit., p. 306.

21 *Ibid.*

22 *Ibid.*,

which *human beings study themselves* in their actions and not the supreme philosophical discipline that takes on the task of justifying humankind's pre-eminent position in the cosmos.

This allows us to broaden our gaze along at least two lines: towards the *inside* of the human world (noting, for example, that different cultures, groups, or social classes think and construct themselves in different ways) and towards the *outside* (functions once considered intrinsically human – part of the human essence – are discovered in plants or non-human animals, while others are replicated or even better performed by machines).

What is of interest for the recovery of a truly general philosophy is the second line of openness, the one towards exteriority: if there is no specific difference of some entities that makes them privileged with respect to others, but only *different perspectives on being*, then there is no reason why, alongside a philosophical anthropology, there cannot be, for instance, a theory of machines that is characterized as a *philosophical techno-logy* or a mechanology[23].

4. Media theory and philosophy.

Today, media theory seems to fit into this vein. It attempts to answer a question asked along the lines of the fourth Kantian question: "what is the medium?". Media theory, however, can also be understood in an essentialist sense, or in the light of the concept of media "action".

An *essentialist media theory* would be a media theory that seeks to identify the specific difference of media, to make them a privileged object of study and, probably, superior to any other. This attitude can be seen especially in the trans-humanist attitude towards computer media, but it is based on exactly the same conceptual errors as modern philosophical anthropology. Even in this case, in fact, some of the functions performed by media machines cannot be considered their exclusive; some are actually performed better than they are performed by other human or non-human individuals, but others are simply performed in a different way; even media build representations of the world (for themselves and for other individuals), which, however, make sense only from a perspectivistic point of view.

A *procedural media theory*, on the other hand, is that media theory that recognizes that a medium can only be defined as such when it is *operative*. Just as the human being is specifically constituted and defined by action, so the machine action defines a machine and *the medial action defines a medium*. It is necessary to try to understand what it means for a medium "to act", how it works and how, according to its function, a medium is distinguished from another object (technical, natural, living) that is not a medium.

In following this line of research, it will soon become clear that a seemingly trivial fact is that *the main function of a medium is mediation*. Therefore, a general

23 In Canada there is a project called *Retracer la Mécanologie*, directed by Ghislain Thibault and Mark Hayward, with the goal of tracing the transnational history of *mechanology* – or *the science of machines* – and its relationship to contemporary media theory. They trace the history of mechanology back to the late 1800s work of Franz Reuleaux on *kinematiks* (cf. F. Reuleaux, *The kinematics of machinery. Outlines of a theory of machines*, tr. A.B.W. Kennedy, Dover, New York 2012), but the use of the term and the idea of a general *philosophical* theory of machines is due to Gilbert Simondon (cf. G. Simondon, *Du mode d'existence des objets techniques*, Aubier, Paris 2012, p. 13).

philosophical media theory will have to properly scrutinize the concept of mediation. In order to do so, it will be appropriate to take into account discourses on physics, mechanics, communication; but the philosophical point of view will be the one that will try to bring back these fragmented areas of investigation to a *general theory of the functioning of the media*.

An objection could be raised at this point: just as philosophical anthropology, purified of anthropocentrism, is nothing more than a study conducted by the human being on the human being, so it would seem that a philosophical media theory must by necessity be a study carried out by the media on the media. Only media, after all, can actually put themselves in a media perspective and therefore enjoy privileged access to their own condition.

This objection partly grasps the target: to study a medium from a theoretical point of view, it is necessary to get as close as possible to its functioning, to measure and represent which, often, other media will be needed. Nevertheless, we must not forget that media interact not only with each other, but also with human beings. The human being has a place in the action of media, just as media have a place in the action of the human being.

Media can be seen, from the human point of view, as aimed at the human being and that is why anthropology also deals with technology[24]. In the same way, from the media point of view, human beings can be seen as aimed at media, at the perpetuation of their functioning, as fundamental hubs of mediation processes. The human being can find itself in a medial condition and can be, assuming the perspective that it is rightfully entitled to from the point of view of the media, an actor in a medial system. It will therefore have the opportunity to take an epistemological position that will allow it to build and expose a procedural theory of media and mediation, describing processes of which it too is a part.

5. Philosophy as an interface science.

The move of pluri-perspectivism restores philosophical dignity to different – but methodologically similar to anthropology – fields, such as, for example, philosophy of nature or, as we tried to show in the previous section, to media theory. This multiplication of areas of philosophy beyond the human world perhaps allows the construction of a *general theory*, provided that "general" does not mean "universal". The generality must not be based, in fact, on *a priori* universality, but on universalization, or rather, it must not be configured as an enlargement, but as the search for a *highest common factor*. But how can such a generality be founded?

It would be unthinkable to expect philosophy to pose itself, so to speak, from the point of view of God, *super partes*, equidistant from any particular position, and able to reconcile any perspective. It can, however, try to assume as many partial points of view as possible, so as to build and grow in the interstice, in the space of

24 Foundational texts of the anthropological approach to the study of environmental and technological influences on human action and evolution are A. Leroi-Gourhan, *L'homme et la matière*, Albin Michel, Paris 1993 and especially Id., *Le geste et la parole* (2 voll.), Albin Michel, Paris 1964-1965 and Id., *Milieu et techniques*, Albin Michel, Paris 2000. For an overview of the innovative and breakthrough concepts proposed by Leroi-Gourhan see F. Audouze, *Leroi-Gourhan, a Philosopher of Technique and Evolution*, in «Journal of Archaeological Research», Vol. 10, No. 4 (December 2002), pp. 277-306.

interaction between the different points of view, between the different components of the same system, in other words: *in the interface*.

Philosophy must therefore not only study mediation, but must practice it: mediation is also interaction between perspectives, communication between different orders of meaning. Putting these orders into communication, as will be seen, is a matter of interface. Therefore, philosophy itself can be understood as a discipline that deals primarily with interfaces.

Indeed, precisely the interfaces will be the main object of study in this work, and this introduction was specifically intended to show the primary and perhaps inalienable interest that they should have for philosophy. However, an philosophy of interfaces understood in such a general sense – so general as to become, after all, synonymous with philosophy itself – would require an effort beyond the purpose we are pursuing here.

Since each age has its own dominant interface(s), the object of this essay will be *digital* screens and interfaces. The challenge will be to try to make us understand how they form and inform our perception, our cognition, and our predisposition to action, thus investing the most classical areas of philosophical speculation, from aesthetics to ethics. But that is not all: it is also a matter of understanding interfaces as a crossroads of different points of view and therefore of reconsidering media and machines as agents and components of a system of which we too are part. To understand and philosophically explore the contemporary – this is the basic thesis – one cannot ignore the study of current interfaces.

The text you are about to read, therefore, wants to be a philosophical work in the fullest sense of the term, in the sense that here we wanted to attribute it, in the sense, perhaps ancient, of a *general theory of being*. However, in order to make philosophy in the contemporary, one cannot disregard the current fragmentation of sciences and the particular and in-depth contribution that each science makes to the general question. For this reason, when dealing with a topic that is as interstitial (and therefore philosophical) as that of interfaces, contributions from media studies, computer sciences, cultural studies, psychology, physics, neurosciences and many other fields that deal both with the technique of the material supports of dominant interfaces and with human perception or action should be taken into account.

This approach could be called multidisciplinary, or interdisciplinary. Between the two terminologies I certainly prefer the suffix "inter-", for the reasons explained above. However, it should not be thought that this is an approach made up of the sum of other approaches: the approach used, although employing different contributions, will be philosophical in its *method* (mainly argumentative and aimed at finding causal explanations) and in its *aspiration to generality*.

If, in antiquity, philosophy was synonymous with science and knowledge, while in modernity it was for a long time only anthropology, today it can only be characterized, in the recovery of a generality that can no longer be all-encompassing and englobatory, as the *science of interfaces*.

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Given the ambition of the project, which seems to contrast with the narrowness of the object of study, it will first be necessary to explain whether and in what way the approach proposed here differs from the philosophies of technology or media. This will in fact be the subject of the first chapter, which will take the form of a brief reconnaissance of the state of the art.

Since it is intended to assume a perspective according to which philosophy is mainly mediation *and* study of mediation at the same time, a conceptual clarification – to which the second chapter will be devoted – regarding the areas of investigation called "media", "mediation", and "mediality", which will become the background of all subsequent discussions, will become essential.

The third chapter will therefore finally come to deal with the main object of this work: interfaces. It will have the task of defining this object starting from the more general terms and then restricting the field to the current digital interfaces between human beings and machines, as well as theoretically justifying this restriction.

The fourth chapter will be dedicated to the study of modes of influence of interfaces on the perception of human beings. It will also connect this "power" of interfaces to their material supports, i.e. screens, tracing the evolution of the relationship between humans and media technologies in the genealogy of the screen experience.

Once understood *how* interfaces affect human beings, an attempt will be made to understand *why* they do so: the fifth chapter will be concerned with systemic interactions between machine components, human components, and the environment, framing the acts of each of these components within a theory of action in the light of the concept of information.

These last two chapters will in fact constitute the sketches of *aesthetics* and *ethics* as branches of a philosophy as a science of interfaces, as a science of mediality, or *philosophical mediology*. The conclusion of this mainly theoretical work, however, will be dedicated to the analysis of practices, which allow to move with greater awareness in a world of interactions that too often seem to escape the control of us humans, all too human.

Finally, if I may, I would like to close this introduction quoting Günther Anders, who was, in turn, quoting Max Weber, to warn readers that «the most important things are of course in the footnotes»[25].

25 G. Anders, *Die Antiquiertheit des Menschen II. Über die Zerstörung des Lebens im Zeitalter der dritten industriellen Revolution*, Beck, München 1992, p. 14, my translation.

I. Towards a Philosophical Mediology

What follows will be an unfairly short chapter. A reconnaissance of everything that, since the last century, has been written, in philosophy and theory, on media, mediation, the information age, the digital is an enterprise out of reach, which would require a specific monograph. But the purpose of this initial chapter is not so much to give the reader full account of the state of the art, but rather to better clarify the approach that the text will adopt and apply in the following chapters.

In fact, it is appropriate to explain both why and in what sense a philosophical approach, which differs from those of sociology, culturology or more specific disciplines such as media studies, is to be adopted, and how this philosophical approach differs from other contributions that philosophy has given or continues to give on these and neighboring issues.

In the following lines there will be inevitable simplifications and flattening of theoretical complexes that would deserve much more in-depth analysis. Indeed, in the continuation of the essay, it will be possible to find insights and discussions on texts that will be barely touched on or not even mentioned here.

It is fair, however, that before I even begin with my quick reconnaissance, I recommend some texts that more and better can provide effective introductions to philosophy of technology, media studies, and philosophy of media.

As far as the *philosophy of technology* is concerned, one of the best introductions, attentive to both continental and Anglo-American traditions, is that of the philosopher of science and social epistemologist Val Dusek[1]. A more recent and up-to-date text, which follows an inter- and transdisciplinary approach, which combines a review of past and present theories with some insights into contemporary and future challenges for thought in relation to technology, is the introduction written by the former President of the Society for Philosophy and Technology Mark Coeckelbergh[2].

Media studies constitute a very wide field, ranging from communication studies, film studies, theater studies, TV studies to media sociology, from technical-engineering approach to culturological one, from theory to practice. For a general overview, useful as an introduction, one can see *Media Studies: Texts, Production and Context*[3] by Paul Long and Tim Wall. However, since the beginnings of media studies as we understand them today are in Canada, in the school founded by McLuhan and ideally dating back to Innis, I think it might be useful to take a look at *The Toronto School of Communication Theory*[4], edited by Rita Watson and Menahem Blondheim.

Since, in the field of media studies, I will mainly deal with *media theory*, it might be helpful for the reader who wants to familiarize with this field of research,

1 V. Dusek, *Philosophy of Technology. An Introduction*, Blackwell, Oxford 2006.
2 M. Coeckelbergh, *Introduction to Philosophy of Technology*, Oxford University Press, Oxford 2019.
3 P. Long, T. Wall, *Media Studies. Texts, Production and Context*, Longman, Harlow 2009.
4 R. Watson, M. Blondheim (eds.), *The Toronto School of Communication Theory. Interpretations, Extensions, Applications*, The Hebrew University Magnes Press, Jerusalem 2007.

to read a book that tries to connect the study of media and communication with problems typical of social and cultural theory, such as *Media/Theory*[5] by Shaun Moores. However, several references will be made in the next chapters to German media theory, or *Medienwissenschaft*, so it is worth mentioning, in English, *Thinking Media and Beyond: Perspectives from German Media Theory*[6], edited by Briankle Chang and Florian Sprengerer and, in German, *Einführung in die Medienwissenschaft*[7] by Knut Hickethier.

In using the contribution of media theory to philosophical mediology, I will often move between media phenomenology and media archaeology, so it might be worth mentioning two texts such as *Conditions of Mediation*[8], edited by Tim Markham and Scott Rodgers and *What Is Media Archaeology?*[9] by Jussi Parikka.

Finally, for a brief, but very complete history of ideas on the *philosophical approach to issues related to media*, from ancient philosophy to the digital turning point, from the automata question to computing, from the discussion of the difference between analog and digital to that on technological determinism, with particular attention to ethical and political issues, a text to consult is certainly *Philosophy of Media*[10], by Robert Hassan and Thomas Sutherland.

Having made this premise, we can get to the heart of the matter and begin the path that will lead us to assume the point of view of what we could call *philosophical mediology*. As said in the introduction, what the reflection contained in this essay is dedicated to is the elaboration, on the one hand, of a philosophical theory of media, an ideal and equal counterpoint to philosophical anthropology; on the other hand, of a study of mediation as a general process of interaction between different orders of reality, as well as a mode of proceeding of philosophy itself.

Therefore the following reconnaissance will first deal with those philosophical and theoretical approaches that have put technical objects or media at the center of their examination and then with those that have raised the issue of information processuality.

1. Philosophy of technology.

«As philosophy goes, philosophy of technology is a relatively young field»[11], states Val Dusek. I beg to differ. Technology has always played an important role in the Western philosophical reflection of all times: starting from the Greek τέχνη, the know-how, distinct from ἐπιστήμη (scientific knowledge) and limited to a precise field, up to the dominant and omnipervasive technology, considered as the final

5 S. Moores, *Media/Theory. Thinking About Media and Communications*, Routledge, London-New York 2005.

6 B. Chang, F. Sprengerer (eds.), *Thinking Media and Beyond. Perspectives from German Media Theory*, Routledge, London-New York 2019.

7 K. Hickethier, *Einführung in die Medienwissenschaft*, Metzler, Stuttgart 2010. With regard, in particular, to media theory, see pp. 365-379.

8 T. Markham, S. Rodgers (eds.), *Conditions of Mediation. Phenomenological Perspectives on Media*, Peter Lang, Bern 2017.

9 J. Parikka, *What Is Media Archaeology?*, Polity, Cambridge 2012.

10 R. Hassan, T. Sutherland, *Philosophy of Media. A Short History of Ideas and Innovations from Socrates to Social Media*, Routledge, London-New York 2017.

11 V. Dusek, *Philosophy of Technology*, cit., p. 1.

destiny of the West, the theme has been treated and discussed by thinkers of all ages and schools.

Technical and philosophical reflection have been intertwined since the origins of Western thought: following the traditional Aristotelian historical-philosophical paradigm, we must say that philosophy was born from the Ionic *engineers*, Thales above all. The first philosophers were above all men with a technical-practical knowledge of nature and of the mechanisms capable of harnessing its powers, and it was precisely from this art of theirs (which invested them with great social prestige in the cities of Ionia) that they were driven in search of the primary realities, passing from engineering to physics, from technique to philosophy, but without contrasting them, rather merging them into a *physiology*.

In the classical age - and in Plato[12] we find evidence of this - τέχνη was already understood as a particular application of science, as a strictly practical activity; yet the true *technician* had to possess a very precise theoretical knowledge of his field of action and, even if only in relation to the ability to delimit his object in an extremely precise way, he still provided a model to the philosopher.

After the long post-classical separation between science and technology[13], between art and craft, the Renaissance saw a new convergence between these areas of knowledge. The paradigmatic figure is Leonardo Da Vinci, who, «engineer and painter, technician and philosopher, became the symbol of overcoming the mentality that radically opposed the liberal arts and mechanical arts»[14]. In this period the *invention* becomes a model for the new science, the *machine* is the engine of innovation, and for this reason even technicians like Biringuccio or Agricola overcome the barriers of medieval university culture and start writing treatises.

The progressive ideal of sixteenth-century engineers did not take long to permeate philosophy and is systematized in the work of Francis Bacon. Techniques become a model for sciences and the mechanism of invention (progress through successive superimpositions and integrations) is translated in terms of the growth of arts and thought in the foundation of academies.

The philosophical attention to the sciences, and especially to techniques, is also important in Descartes and Pascal, but reaches its highest point with the encyclopedism of Diderot and D'Alembert.

In the contemporary age, reflection is much more problematic and ambivalent. It becomes evident to philosophers the potentially violent and subjugating character of technology, as well as the alienation caused by mechanical work. For the Luddists and some utopian socialists the "fault" is of the machines themselves, for Marx, instead, the "evil" does not lie in the essence of the technology, but in the economic structure and in the ownership of the (technical) means of production. Horkheimer and Adorno see in Enlightenment reason the roots of economic and technocratic totalitarianism[15]. The line of thought that refers to Nietzsche (or perhaps more to his interpreters) instead sees in technology the

12 Cf. G. Cambiano, *Platone e le tecniche*, Laterza, Roma-Bari 1991.

13 With the important exception of Roger Bacon. Cf. F. Alessio, *Mito e scienza in Ruggero Bacone*, Ceschina, Milano 1957.

14 P. Rossi, *I filosofi e le macchine 1400-1700*, Feltrinelli, Milano 2009, p. 45, my translation.

15 Cf. M. Horkheimer, T.W. Adorno, *Dialectic of Enlightenment. Philosophical Fragments*, tr. en. E. Jephcott, Stanford University Press, Stanford 2002.

fulfilment of the age of nihilism, with the triumph of calculating reason: the destiny of the West coincides with the destiny of technology[16]. In this vein we can also inscribe Heidegger, who nevertheless treats the technique like a *Frage*, a question, a problem, which, however, in the end, is not solved and remains in the ambiguity between the folds of the Swabian philosopher's thought[17].

Technology is treated, therefore, on the one hand as a potentially harmful and dehumanizing, but also useful and liberating means, depending on the economic structure or dominant thought from which it is directed and conditioned; on the other hand as the final (and necessary) manifestation of a destiny written at the dawn of the West by metaphysical thought.

In any case, in the vein of philosophy of technology, a specific discourse on media is missing. When they are treated, this is done mainly in relation to the mass media, mostly with critical intent[18]. The accent is normally placed on content much more than on the means and the media are observed and studied above all as a sign of the times, much more than as entities.

However, what must be kept from the philosophy of technology is the attention to the system, to the connections between the medial sphere, the human sphere, that of nature, and that of being in its general sense; the the thematization of the mechanisms of invention, as well as of autonomous evolution of the machine system; the analysis of the potential but also of the risks connected to the relationship between human beings and technology. As will be seen, all these conceptual tools made available by the philosophy of technology will be very useful for mediological reflection.

2. Media theory.

The philosophy of technology has always studied the evolution of techniques and above all what they do to the human being or to thought. But why do they do it? And how? To answer these questions effectively, it is necessary to turn to the material means that allow our access to technology and that mediate our relationship with other human beings, with the technical apparatus, with the natural environment, or with the social environment. In other words: we must turn to the media.

This can help us understand why the technological system affects us and, to a certain extent, determines us. Perhaps it is not necessary to think of some metaphysical force that guides the destiny of mankind and that is expressed

16 Cf. E. Severino, *Téchne*, Rusconi, Milano 1979 and Id., Il destino della tecnica, R.C.S., Milano 1998.

17 For the concept of technique limited to "handiness" (*Zuhandenheit*) in the first Heidegger, see M. Heidegger, *Being and Time*, cit., pp. 62-67. The most important (and most ambiguous) essay on the subject of technique, however, remains Id., *The Question Concerning Technology*, in Id., *The Question Concerning Technology and Other Essays*, tr. en. W. Lovitt, Garland, New York-London 1977, pp. 3-35.

18 See, for example, the reflections of Günther Anders on the television viewer as a mass hermit (cf. G. Anders, *Die Antiquiertheit des Menschen I. Über die Seele im Zeitalter der zweiten industriellen Revolution*, Beck, München 1961, pp. 101 ff), or those of Marcuse on how the massification of culture deprives it of its antagonistic force (cf. H. Marcuse, *One-Dimensional Man. Studies in the Ideology of Advanced Industrial Society*, Routledge, London-New York 2006, p. 67) and how technological evolution makes the «communication of transcending content [...] technically impossible» (*ibid*., p. 71).

through the progressive independence of the artefacts from their creators, nor is it sufficient to look for external economic, social, scientific, cultural reasons that decide the usage of certain technologies. Perhaps there are eminently *technical* reasons, already embedded in the basic logic of the media with which we interact.

Above all, questioning the media can lead us to understand how they condition human behaviour, starting from the influence they have on perception, then on cognition, and finally on the action of human beings.

In order to gain insights into these issues, which should be of interest to the philosophy of technology, it will therefore be appropriate to start with an analysis of media as media. It will be a question of applying that media theory as an analogue of philosophical anthropology mentioned in the introduction.

As anticipated, a good media theory must be procedural. This is because to understand how and *why* media act on human beings (but also on groups or environments) it is necessary to understand *how* they act in general. This could be one of the meanings of the oracular formula carved on the milestone that marks the beginning of media theory: "the medium is the message".

In fact, «[m]any people would be disposed to say that it was not the machine, but what one did with the machine, that was its meaning or message»[19], but, if we are interested not in the products of the operation of the machine, but in the ways in which it alters the relationships between human beings, between them and the environment, between them and the technological system, then it matters little «whether it turned out cornflakes or Cadillacs»[20]. *A fortiori* this is true for medial machines – or simply "media" – because «the formative power in the media are the media themselves»[21].

Given, therefore, that a medium is defined as such by virtue of certain operations (which will be explored in more detail in the next chapter), media theory should be characterized as an analytical discipline, aimed at clarifying and dissolving problematic issues: through "close to the object" observation, through reverse engineering operations, also through the reconstruction of a (non-linear) "history" of the genesis of a given medium, media theory will be able to free the field from false problems and prevent philosophical speculation from moving too far away from the materiality of the technical-media apparatus.

Media theory, therefore, is not only a field of academic investigation, but represents a very useful discipline to redefine our approach and our understanding of the medial universe, particularly in the contemporary digital condition. Mass digital culture, in fact, is a paradoxical condition of ease in an environment saturated in digital media, often ignoring their mechanisms and functioning. The task that media theory fulfills, therefore, is to make us aware of the role of those material objects that enormously shape our access to the world.

But what makes this kind of study theoretical? How does it differ from an engineering approach? First of all, media theory must reveal the epistemological issues related to the materiality of the media. E.g.: How do the media receive, transmit, store, process *information*? How do they sample reality (continuously, like

19 M. McLuhan, *Understanding Media. The extensions of Man*, Routledge, London-New York 2005, p. 7.
20 *Ibid*.
21 *Ibid*., p. 22.

analog media or discreetly, like digital media; according to chemical-physical processes; through electrical signals; through coding)? What temporal regimes do they obey and how does the intrinsic temporality of a medium interact with the temporal perception of a human being? What kind of communication (perceptual or symbolic) can a medium have with other media, with the environment, or with human individuals, and what other kinds of communication does it preclude? How does the structure of a medium change its perception of reality and that of those who use it? These and others are questions that cannot be separated from a close technical analysis of technical objects, but remain theoretical and epistemological questions to which a good media theory must be able to answer.

What I therefore consider a good media theory is one that includes the following aspects: (i) research of the technological *a priori* that make certain phenomena or interactions possible, (ii) study of *time-critical* aspects, (iii) attention to *hardware* issues, (iv) *reverse engineering*[22]. In other words, the media theory that I believe is best suited to provide a solid basis for philosophical mediology is media archaeology and, in particular, *radical media archaeology*[23].

However, although a media theory is indispensable to build a philosophical mediology, it remains focused exclusively on the objectivity of the medium and its intrinsic processuality. Even those branches of media theory that, more than on objects, want to focus on the interactions between these particular objects (or the cultural forms they support) and human beings (as can be, for example, film studies, TV studies, etc.), or those that prefer to study cultural techniques (becoming, in fact, anthropologies of technology) specialize in particular forms of mediation. Media theory, in other words, cannot exhaust the task of a philosophy that wants to be general theory.

Nevertheless, as will be seen, in this work the use of media theory will be frequent and, as already mentioned in the introduction, it fully deserves the rank of a particular philosophical discipline. This is because the role of a good media theory in the contemporary condition must be to prepare the ground for a technically and technologically informed philosophy.

3. Simondon: technical objects and information.

If the philosophy of technology dedicates its analysis to systematic connections, but neglects the objectivity of the media, while media theory – especially in the version that we have chosen to prefer here – analyzes the object *per se*, but risks neglecting systematic process and interconnections, in Gilbert Simondon's philosophy we can find an approach that satisfactorily combines these approaches.

Simondon was probably the last great systematic philosopher, able to provide an ontological theory (or rather: *ontogenetics*) that understands and explains, from a philosophical point of view, physical, biological, psychic, social, and technical

22 By "reverse engineering" (or "back engineering") is meant a process by which an artificial object is disassembled and analyzed in its design characteristics, functional architecture, or to derive from it knowledge not possessed *a priori* (either because the researcher is not the designer of that object, or because that object has acted or reacted differently from the purpose for which it was designed).

23 Cf. W. Ernst, *Radical Media Archaeology (its epistemology, aesthetics and case studies)*, in «Artnodes», n. 21 (2018), pp. 35-43.

reality, without ignoring and, indeed, using extensively the contributions of the hard sciences in these fields.

The starting point of Simondon's philosophy lies in the concept of "individuation". It is understood not as a principle (which would be an individual, or an individual substance, preceding individuals), but as a *process* in continuous evolution[24]. It is from the *phasing* of being as being, from a sort of Anaximander's ἄπειρον, that individuals originate: *physical individuals* first of all, who structure themselves in successive stages, by transductive[25] jumps, so as to resolve unstable situations, imbalances of matter and potential energy, leading them towards a metastable equilibrium that would be impossible in the primordial structure.

Some physical individuals then, when new compatibility problems arise, take advantage of the amount of ἄπειρον left available to restructure themselves *and* the environment, becoming, at the same time, *actors* and *theater* of individuation processes, thus giving rise to *biological individuation*, i.e. to life.

The living being, however, finds before it new problems, first of all perceptive, and passes from *primordial tropism* to *background-figure distinctions*, up to the mechanisms of perception and action that characterize the *psychic individual*.

Psychic individuals, however, will be faced with further problems: the clash between *virtual* and *actual*, between the possibilities left open, the amount of pre-individual still to be structured, and the impossibility of doing it with one's own strengths. This leads to *anguish*, which, according to Simondon, finds its solution in a further individuation, which allows us to go beyond the simple interindividual and give life to what is called "transindividual" and which coincides with the rise of the *collectives*.

However, these different stages of individuation should not be understood in a strictly chronological sense. Collective individuation, for example, is not only the rise of groups, but also psychic restructuring of the individual, *individuation of the social individual*. Psychic and collective individuation occurs at the same time and uses devices that convey them, from institutions to technical objects.

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24 The theory of individuation or ontogenetic theory is elaborated and exposed in all its phases (physical, vital, psychic, and collective) in the main work G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, Millon, Grenoble 2017.

25 The term "transduction", as often happens to be found in Simondon's works, is borrowed from a specific technical-scientific language. The concept of transduction is particularly suitable to describe the mechanism of individuation since it is a notion already used both in physics and biology. In general it indicates the transmission of energy from one point to another of a system, but the peculiarity of the transductive process lies in the fact that it is accompanied by a change in the nature of the energy in question (e.g. mechanical energy converted into electrical energy), thus indicating a leap, a transformation that connects apparently different but contiguous orders. In physiology the word indicates the transformation of a physical stimulus into a nervous signal by specialized receptors. In biology, signal transduction is the process by which a cell converts an extracellular signal into a specific response that often involves a change in the expression of its genes. In general, therefore, it can be said that transduction is the transmission of a functional scheme, which, however, must be translated so as to be compatible with the system that receives it, so as to restructure this system according to its own functional instructions. In Simondon's own words: «transductive operation will be the propagation of a structure that gradually gains field from a structural germ [...]; this presupposes that the field is in metastable equilibrium, i.e. it contains a potential energy that cannot be released except because of the appearance of a new structure, which is like the resolution of a problem» (i*bid.*, p. 538, my translation).

A fundamental part of Simondonian reflection is dedicated to *technical objects*[26]. Also of the "technical individual", in fact, he studies the genesis, starting from the "elements", in the direction of the "ensembles". Moreover, a "technical individual" is not only the machine, but also the human being who, through the information brought by the machine, inserts itself, both actively and passively, in the machine's environment and in its functioning.

The very concept of *information* becomes fundamental in ontogenetic theory. How Simondon defines it will be further explored in the next chapter, but for now it is enough to say that this notion is opposed to that of "form", to the search for a "good form", and to *principium individuationis*. In the unity and indistinction of the pre-individual being there can be no room for a form that is pre-existing and ungenerated: reality is procedural and forms follow one another in a constant and inexhaustible search for temporary balances in dynamism. This succession of forms, this resolution of the problems that occur both in the physical realm and in the biological, psychic, social or technical realm, this transmission of individuation instructions, this is *in-formation*. The information, moreover, is «the keystone of any doctrine of reciprocity, equivalence, or even reversibility of the active and passive terms in the exchange»[27], since information is that transmission that puts different orders into communication, making them, at least momentarily, homogeneous with each other.

The notions of technique and information, in Simondon, then acquire a very interesting metatheoretical role. According to the author, in fact, at the origins of human thought, to dominate was *magic thought*[28], and then a phase shift would occur: *religious thought* has gone to represent the background, the "more than unity", the totality, and has assumed as its own scheme that of *deduction*; *technical thought*, or *technicality*, represents instead the objects, the "less than unity", the elements, and proceeds according to *induction*. In between these two modes lies *aesthetic thought* as a *tendency* towards unity, juxtaposition of elements and background, which follows the *analogical method*.

However, according to the author, the aesthetic enterprise is destined to fail for several reasons, including the inadequacy of the analogical scheme and the fact that there is no *pure* aesthetic object or *pure* aesthetic judgment. According to Simondonian theory, in fact, every object, before being aesthetic, is an artifact (and therefore a technical object)[29]. Without going further, for the moment, into Simondon's aesthetic theory, we can limit ourselves to noticing how technicality already seems to take on a potentially more general role than the particular one

26 The *summa* of Simondon's philosophy of technology can be found in Id., *Du mode d'existence des objets techniques*, cit.

27 Id., *L'individuation à la lumière des notions de forme et d'information*, cit., p. 538, my translation.

28 Such thought must not be confused with what we today call "magic" (which is at most a residual thought that refers to its ancestral origins), reducing it to superstition: magic thought is the one that precedes the distinction between figure and background, as well as that between theory and practice, between subjectivity and objectivity or even between space and time. The world was conceived as a space-time reticular structure, made of privileged places and moments, *points-clefs* identified from time to time as places and moments where there was a possibility of insertion for the action. (cf. Id., *Du mode d'existence des objets techniques*, cit., p. 228).

29 Cf. *ibid*., p. 267.

assigned to it by the first phase shift of thought.

According to Simondon's reconstruction, this shift in thought does not stop at the level of opposition between religion and technicality: both these modes are articulated in *theoretical* and *practical* thought. The practical thought of technicality is that which concerns the *fragmented action*, applied to the elements, unable, on its own, to give itself unity and effectiveness. For this reason it must have a theoretical correspondent, which shifts the attention from the figures to the background, from the elements to the figurative schemes: it is the *inductive thought*[30]. Inductive thought, however, is also confronted with a blockage when figurative patterns collide with natural limits[31]; the need to know and systematize these limits therefore arises, and it is here that one side of religious thought's phase shift intervenes: the *dogmas* of theoretical religious thought and its *deductive method* become the model for the elaboration of the *laws of nature*. If the theoretical technical thought concerns the background, the religious one outlines the figures and in this polarity formed by the extremes of deduction and induction *scientific knowledge* was born[32].

What has been talked about so far is the phase shifting of thought in relation to the *natural world*, but, according to the author, there is also one that concerns the conceptualization of the *human world*. In the magical mode of thought there was the intersection of these areas that interacted – without distinguishing themselves – in the *points-clefs*. However, with the progressive psychic individuation of human beings, the detachment took place and so the magic thought has shifted in four different ways: religion and technicality in relation to the natural world; political thought and human techniques[33] in relation to the human world[34].

At this point Simondon proposes to rethink the role of philosophy as a unifying discipline of culture: acting in the field of thought in respect to the human world, it can work to look for the *functional analogue* of aesthetic thought, which is able to *realize* the new dimension of compatibility (and not only to tend to it) between the thought of the super-unity (socio-political) and that of the sub-unity (technical)[35].

This unification passes through the elaboration of a *general technology*: if the human individual is also involved in the individuation of the technical object, there will be *functional schemes* that put the two individualities into relation[36] and «a

30 Cf. *ibid*., p. 280.

31 Cf. *ibid*., p. 282.

32 Cf. *ibid*., p. 222. Obviously, for Simondon, there is also a practical religious thought, which concerns the background and suggests an ethic of duty (cf. *ibid*., p. 286) and of intentions (cf. *ibid*., p. 243); the fragmented action of practical technical thought, on the other hand, is the one that bases applied and consequentialist ethics, utilitarianism above all (cf. *ibid*., p. 244). The one between pure ethics and applied ethics is the dyad at the center of which ethical thinking develops (cf. *ibid*., p. 242).

33 As will be seen also *infra*, p. 70, the polarity between human (or cultural) techniques and technicality must be taken into account, in particular in relation to the general definition of interface.

34 Cf. G. Simondon, *Du mode d'existence des objets techniques*, cit., p. 293.

35 Cf. *ibid*., p. 296.

36 This relationship, as will be argued below, is exactly the *mediation* relationship that takes place thanks to and in the *interface*.

technique of all techniques can be developed through the generalization of these schemes»[37]. As a first step, the pattern of recurrent causality (feedback) that allows the technical object to be reintegrated into the natural world should be generalized; then technical thought must extend to incorporate also needs and modes of being of the environment associated with the technical individual (of which the human individual is also a part); finally, a thought that is not only technical, but *polytechnic*, must move from the analysis of the individual to the analysis of the ensembles in order to assume a *reticular structure* analogous to the socio-political one and which *is* also a socio-political structure, as it conditions human action[38].

Provided that the reticular structure of technicality, and the propagation of information through it, is recognized as a *normative power* that can also address the environment and human individuals, a true general technology can find in it patterns prior to the human world-natural world split, becoming a study of a «polytechnic universe, both natural and human»[39].

The conceptual apparatus provided by Simondon is therefore extremely suitable for philosophical reflection on media, mediation, and medial condition and, in fact, in the following chapters extensive use will be made of some categories borrowed from ontogenetic theory. The author, indeed, dedicates himself as much to the precise, close analysis (it is enough to see the extensive explanations, but also the illustrative tables[40] dedicated to the examination of technical elements such as the vacuum tube) of technical objects, as to the elaboration of a general theory of information, a key concept, as we shall see, in the definition of mediation.

Moreover, he tries to generalize the role of information to such an extent that, in the light of it, he formulates a unified theory of culture that does not annul, but recomposes its phase shift, in an effort not far from the one I proposed in the introduction to bring philosophy back to its role of general theory of being, working in the interstices between particular disciplines thanks to the notions of mediation and interface.

However, in Simondon's works there is no specific treatment of the theme of mediation as a type of individuation, nor in connection (if not in some scattered hints) with information.

Obviously, then, the French philosopher could not adequately address the role of information in the development of contemporary technologies, of which he could only see the beginnings. Nevertheless, as will be seen, some of his insights still remain valid and can be used and extended to the analysis of the contemporary medial condition.

The present work aims to fit into a Simondonian framework, in particular by resuming the path of that theorization that links technicality to aesthetics and politics. However, what is intended is that the categories of *media*, *mediation*, and *mediality* can complete Simondon's theoretical apparatus and that *philosophical mediology* can complete the project of rediscovering the reticular unity of thought sketched by Simondon.

37 *Ibid*., p. 298, my translation.
38 Cf. *ibid*., pp. 299-300.
39 *Ibid*., p. 300, my translation.
40 Cf. *ibid*., pp. 103-119.

4. Philosophy of information.

The concept of information, as exposed by Simondon, has a high potential of generality: in the light of this concept several problems of philosophy could be reconsidered, especially in the medial field and even more within the contemporary condition, dominated by *information technologies*, that is, technologies that make the manipulation of information their main characteristic.

It is no coincidence that one of the most powerful conceptual buildings constructed by contemporary philosophy is the so-called *philosophy of information*, elaborated by Luciano Floridi. Floridi's monumental theoretical work, which takes the not exactly modest name of *Principia Philosophiae Informationis*, is still in the making and could really be studied in its completeness and complexity only once it has been completed[41]. However, in the following lines the key points of its elaboration and its fundamental definitions will be briefly and succinctly set out.

First of all, it is appropriate to start from the definition of the philosophy of the information provided by the author in a programmatic article:

> philosophy of information (PI) = the philosophical field concerned with (a) the critical investigation of the conceptual nature and basic principles of information, including its dynamics, utilisation, and sciences, and (b) the elaboration and application of information theoretic and computational methodologies to philosophical problems[42].

This research programme comprises a theoretical part (a) and a practical part (b). As will be seen, the media and mediation philosophy project proposed here, while being treated more from the first point of view, will also aspire to a similar dual scope.

What will now be examined, however, will be above all part (a) of the definition, in order to understand if there can be a coincidence between the concept of information elaborated by Floridi and the field of investigation concerning mediality on which this essay proposes to reflect.

What makes Floridi's approach to information theory really philosophical is the fact that he is not dedicated to «a quantitative theory of data communication», but rather to develop

41 The "Tetralogy Project" on which Luciano Floridi has been working since at least the beginning of the second decade of the twenty-first century – although he has been developing his idea of a philosophy of information as an independent field of investigation since the late Nineties of the twentieth century – seems now close to its conclusion. The Italian philosopher, in fact, has already published, until the moment I write, three of the four books that constitute a veritable system: L. Floridi, *The Philosophy of Information*, Oxford University Press, Oxford 2011, Id., *The Ethics of Information*, Oxford University Press, Oxford 2013, and Id., *The Logic of Information*, Oxford University Press, Oxford 2019. The three books deal respectively with the fundamental and general principles of the philosophy of information, the ethical challenges posed by Information and Communication Technologies (ICTs), and the mechanisms through which data collected from the world are semantically processed and transformed into information, according to the assumption that knowledge is conceptual design. The next and last text, for which there is not yet a release date, should be titled *The Politics of Information* and should deal with the political and socio-economic implications of ICTs.

42 Id., *What is the Philosophy of Information?*, in «Metaphilosophy», Vol. 33, No. 1/2 (January 2002), pp. 123-145: 137.

> an integrated family of theories that analyse, evaluate, and explain the various principles and concepts of information, their dynamics and utilisation, with special attention to systemic issues arising from different contexts of application and interconnections with other key concepts in philosophy, such as being, knowledge, truth, life, and meaning[43].

For this reason, his critical investigation on a theoretical level addresses (1) *the conceptual nature of information* and (2) *its basic principles*. As for point (1), it is to immediately recognize the slippery nature and the non-univocity in the definition of the concept of information. Floridi's proposal is, therefore, to investigate the notion of information «only in relation to well-specified contexts of use»[44].

For this reason, in fact, the resolution of point (1) slips into that of point (2): the reconnaissance of the *dynamics of information utilization*. This is a very important point for the elaboration of a philosophical mediology, because mediation processes, as will be seen, are nothing but passages of information or changes of state mediated by information.

> By "dynamics of information" the definition refers to: (i) the *constitution and modelling of information environments*, including their systemic properties, forms of interaction, internal developments, and so on; (ii) *information life cycles*, that is, the series of various stages in form functional activity through which information can pass, from its initial occurrence to its final utilisation and possible disappearance; and (iii) *computation*, both in the Turing-machine sense of *algorithmic processing* and in the wider sense of *information processing*[45].

This broad definition of information dynamics could easily be included in a definition of "mediation". Mediation is in fact *a process that proceeds by leaps and bounds of state* to arrive from an apparent incompatibility to a state of relative balance and communication (ii); *computation is a type of mediation*, i.e. a mediation that follows an *algorithm* (iii); but above all, mediation simultaneously individuates individuals as poles of a communication and an *environment* that structures itself (i). Precisely in such an environment (or perhaps better "in such *milieu*") and by virtue of the mediation and interaction between components, as will be discussed in more detail in the fifth chapter, *systemic properties emerge*.

One of the greatest merits of the philosophy of information is therefore that of having reintroduced an environmental investigation, in particular through the elaboration of the notion of *infosphere*.

Conceiving the environment, or at least one of its levels, as an infosphere has very important implications. The concept of infosphere allows us to have a trans-historical category that frames the relationships of human beings and the world with the amount of information and its material supports. In spatial – metaphorical but also real – terms, we can observe the growth of this infosphere until we see it, today, in the digital age, encompassing almost the entire environment. We observe it in a multitude of typical contemporary phenomena: from the remodeling of the world based on the exigencies of ICTs to the interpretation of every aspect of it in

43 *Ibid.*
44 *Ibid*., p. 138.
45 *Ibid*.

informational terms, from the computerization of artifacts to that of entire social environments[46].

But how exactly is the infosphere defined? A short but incisive definition can be found in a brief article included in a collective volume in Italian:

> Infosphere: semantic space made up of the totality of *documents*, *agents*, and their *operations*[47].

This definition includes three terms that are worth reflecting on in order to understand the merits of the philosophy of information, but also the profound difference with the mediological approach that will be proposed. The first word is "documents", by which Floridi means «any type of data, information and knowledge, codified and implemented in any semiotic format»[48]. Let us leave this definition aside for a moment, which we will come back to later and which tells us something more precise about how the Italian philosopher understands the very concept of information.

The second word is "agents" and is understood as «any system capable of interacting with a document autonomously, such as a person, an organization, or a software robot on the Web»[49]. This definition of agent, as will be seen in the fifth chapter, is very close to the deanthropologized notion that philosophical mediology wants to propose. This deanthropologization is due to the very "neutral" meaning, not moralizing or humanistic, which is given to the concept of "action", here defined by the third word, "operations", by which it is meant «any type of action, interaction and transformation that may be carried out by an agent and to which a document may be submitted»[50].

The insistence in this definition is placed on *documentality*. As will be seen, this is a rather reductive way of understanding information. In any case, one can reformulate a theory of action on the basis of the philosophy of information by saying that *an agent is any system that manipulates or interacts with information*, while *action is exactly any operation of manipulation or transformation of information* performed by an agent. The set of *agents, actions, and information itself constitutes the infosphere*: acting, in fact, means not only acting within an environment, but also helping to preserve and build this environment, which is called infosphere.

To act, for Floridi, is to *envelop* the world. It is an environmental and systemic conception. In particular, the type of action of an ICT consists precisely in this: «enveloping the environment into an ICT-friendly infosphere»[51]. An ICT can therefore act, just as a human being can, and, in acting, it creates an environment by incorporating other entities into it: it makes use of other entities by enveloping them. This means that an ICT can make use of a human being, when it makes use of

46 Cf. Id., *The Fourth Revolution. How the Infosphere is Reshaping Human Reality*, Oxford University Press, Oxford 2014, p. 43.

47 V. Di Bari (ed.), *Le parole della Net Economy A-L*, Il Sole 24 Ore Libri, Milano 2002, entry: "infosfera" (by L. Floridi), translation and italics mine.

48 *Ibid*., my translation.

49 *Ibid*., my translation.

50 *Ibid*., my translation.

51 L. Floridi, *The Fourth Revolution*, cit., p. 144.

it as an *inforg* (informational organism)[52].

This concept of inforg is very close to the position according to which «human beings can be seen as aimed at media, at the perpetuation of their functioning, as fundamental hubs of mediation processes»[53]. However, there is a fundamental difference: the interaction between ICTs and inforgs is not medial. In the philosophy of information there is no mention of a reciprocal communication or action between two or more elements in a medial condition. The interaction between ICTs and inforgs is to be understood more in the sense of a *semantic interpretation* (by inforgs) of *syntactic information* (transmitted by ICTs, which "use" the inforgs as translators, since they are not able to attribute meaning to the syntax themselves): «sometimes our ICTs need to *understand* and *interpret* what is happening, so they need semantic engines like us to do the job»[54].

It is not really the action of a medium on a human being[55]. What Floridi refers to is rather an action of the human being aimed at compensating the deficiencies of a machine[56]. It is no coincidence that the first example he brought is that of CAPTCHA[57]. This is because the only type of action in the light of the notion of information conceived here seems to be semantic. The notion of information, as evidenced by the aforementioned definition of infosphere, seems to be too much linked to that of documentality, which is ultimately the product of a textual paradigm, focused more on content than on operation.

The equation between information and document is not, in fact, always true. A

52 Cf. *ibid*., p. 94.

53 *Supra*, p. 13.

54 L. Floridi, *The Fourth Revolution*, cit., p. 146.

55 It does not seem that Floridi ever attributes to the medium a real capacity for action. The basic scheme of the role of medial technologies (although not defined in this way by the author) proposed by him (and which will be criticized in the next chapter, when discussing the definition of "medium") is the user-medium-prompter one (written by him as user-technology-prompter, cf. *ibid*., p. 26). The position of user is covered by the human being in the technologies he calls first- and second-order, where the prompter may be nature (first-order) or another technology (second-order). The third-order, exemplified by the Internet of Things, responds to the technology-technology-technology scheme. This vision of medial technologies is therefore extremely linear: the real agent is only the first pole, while the action of the prompter is, precisely, to prompt («[w]hat the sun does is to prompt the development and then the wearing of the hat», *ibid*., p. 25), from a rather finalistic point of view, directed to the development of the actual action of the user. The medium is treated as a simple channel, equipped with a two-faced interface: the interface between user and medium and the interface between medium and prompter (cf. *ibid*., pp. 34-37). As will be seen in the next chapters, the interface issue is much more complex than that.

56 This is no longer even necessary in so-called *third-order technologies*, «able to monitor, learn, advise, and communicate with each other» (*ibid.*, p. 44). In fact, these are rather the real actions of artificial systems, but it would seem that the elaboration of Floridi lacks a satisfactory analysis of the interaction between these systems capable of acting, the human components, and the (non-informational) environment. Human beings seem to be relics of first- and second-order technologies, or to be just *operators* that exercise a control *on* the loop (no more *in* the loop) (cf. *ibid*., p. 30), increasingly marginalized by the advancement of third-order development. Yet as long as there are human beings and natural environments, they will inevitably interact with technologies, even when they are perfectly capable of doing without them.

57 Cf. *ibid*.

document is a social object[58], i.e. a recorded act which is recognised as having a value or meaning in a given context[59]. In the case of information brought by digital media the equation could hold up: it can be said, for instance, that a certain sequence of electrical impulses, syntactically processed so as to return an image on a PC screen, is interpreted as equivalent to that certain image by virtue of the consent of the observers who can recognize it. This implies that the document has a certain history, or presupposes it (presupposes a social history of the observing community) in order to be interpreted. But this does not apply to most of the analog media.

A vinyl record is not a document[60], since vinyl recording is not a social act susceptible to interpretation, but a *physical signal materially written* on a support, physical too. The vinyl recording records and crystallizes a particular moment, without making a distinction between message and noise, and allows it to be re-presented as it was even decades later. In this sense, what is re-presented by means of the information brought by the vinyl, is not a copy of a certain performance or the master of a certain album: it is that same performance, that same master[61]. It is not a question of technical reproducibility, in the Benjaminian sense, but of real *re-presentification*, and therefore of technically mediated *asthoricity*.

In the case of vinyl the distinction between message and noise can certainly be operated by an inforg, but this will happen simply because, as long as it is not too loud, its acoustic apparatus will tend to ignore the noise. But the medium will never ask it to interpret information semantically, simply because analog media are not semantic media, but, despite this, they transmit information. Floridi makes a distinction between the *technical*, *semantic*, and *influential* levels of information[62], making it clear that the technical level simply concerns the way information is transmitted, but that it becomes real information only once it is interpreted semantically, so that it can exert an influence on the processes of cognition and, as a

58 Cf. M. Ferraris, *Documentality or Why Nothing Social Exists Beyond the Text*, in C. Kanzian, E. Runggaldier (eds.), *Cultures. Conflict – Analysis – Dialogue. Proceedings of the 29th International Ludwig Wittgenstein-Symposium in Kirchberg, Austria*, Publications of the Austrian Ludwig Wittgenstein Society, New Series, 3 (2007), pp. 385-401. For a more complete introduction to Maurizio Ferraris' social ontology and theory of documentality, see Id., *Documentalità. Perché è necessario lasciar tracce*, Laterza, Roma-Bari 2009.

59 Cf. J.R. Searle, *The Construction of Social Reality*, Free Press, New York 1995.

60 Floridi also uses the example of vinyl to explain the difference between analog and digital information. Very correctly he says that analog media *record* information, while digital media *encode* it. However, on the subject of vinyl, he also writes that «they store mechanical, continuous *data* that *correspond* to the recorded sounds» (L. Floridi, *Information. A Very Short Introduction*, Oxford University Press, Oxford 2010, p. 25, italics mine). This last assertion is not correct, since no *symbolization* process (no data) or *correspondence* (which would imply a symbolic reference) takes place in the vinyl recording.

61 This is not to claim that analogically recorded sound is necessarily more accurate or of better quality, nor that the recording and reproducing media do not change the recording or reproduction of a certain recording. What is intended to emphasize is rather that the inscription of sound waves on vinyl constitutes a *physical act* and not a social one. Reproduction, in fact, is not an interpretative act, nor does it require a consensus, nor necessarily an audience: it is simply the physical re-presentification of sound waves that correspond to the material form of that particular groove.

62 Cf. *ibid*., p. 2.

consequence, also in the social and economic spheres[63]. And yet what is transmitted by analogical media would seem to be only information in a technical sense, capable, however, of physically activating first of all perceptual processes, which could subsequently lead to cognition or action.

The much more materialistic conception of information[64] that will be adopted in the present text would therefore seem incompatible with a purely semantic conception. In order to explain how information is able to influence processes in different systems, it is necessary to be able to explain how it is capable of affecting reception systems, human or non-human. And this can only be a physical explanation, by virtue of what can be called Causal Principle of Reality (CPR)[65].

But when Floridi speaks of "physical information" he mostly refers to the thermo-dynamic correlates of communication processes[66], not to information itself as a process of physical transformation. Even when it refers to biological information, it does not treat it, as Simondon does, in terms of vital individuation, but only in terms of instructions which regulate cycles and processes (at the level of genetic code, for instance), as perceptual inputs that come from the environment and become material to process[67], or, at most, in reference to neuronal information[68], again seen in its function of semantic "calculation".

This way of considering information is in the wake of those theories that treat information as a *de-physicalization of the world*, a semantic interpretation of it, which subsequently allows us to augment our ontology[69] by adding non-physical, purely semantic, *purely informational entities*[70].

With this I do not intend to discredit Floridi's system and the philosophy of information. I merely note that, despite some convergences, it deals with a different domain than that in which philosophical mediology operates. The philosophy of information deals with information in the syntactic and semantic sense, a sense that does not cover the whole field of information, which also needs the notion of mediation as a fundamental operation that justifies the interaction between different and apparently incompatible information systems.

Mediology then deals not only with the operations, but also with the operators, not only logical, but above all physical-material, that is, the media, as well as with their material relations with humans and with the environment. That is why, although mediology also includes a reflection on ontology, ethics and politics, unlike the philosophy of information, it can replace logic with aesthetics (or include it in this).

63 Cf. *ibid*., pp. 88 ff.

64 To *virtual materialism* (cf. Id., *The Fourth Revolution*, cit., p. 50) will be opposed what could be called *informational reductionism*.

65 Cf. T.M. Powers, *Real wrongs in virtual communities*, in «Ethics and Information Technology», n. 5, 2003, pp. 191-198: 192.

66 Cf. L. Floridi, *Information*, cit., pp. 60 ff.

67 Cf. *ibid*., pp. 73 ff.

68 Cf. *ibid*., pp. 82 ff.

69 Cf. *ibid*., p. 109 and Id., *The Fourth Revolution*, cit., p. 50.

70 «[W]hat is real is informational and what is informational is real» (*ibid.*, p. 41).

5. Mediology.

So far I have described mediology as the most complete and comprehensive approach among those who study the medial condition in general and the contemporary one in particular. However, I have often added to the noun *mediology* the adjective *philosophical*. It is therefore time to clarify what is meant by mediology and above all in what a genuinely philosophical mediology differs from a non-adjectivated mediology and why it is precisely this approach that has been chosen in this work.

The term mediology (in French *médiologie*) was introduced in the late 1970s by Régis Debray[71] and indicates a broad approach to the study of cultural transmission and medial environments. It tries to redefine the differences, but also the close and indissoluble relations between culture and technology and, above all, includes both these poles in its analysis[72]. In short, it would seem to be the most suitable discipline to keep together the attention to systemic interactions, the analysis of technical-media objects, the reflection on information as a fundamental transmission force within the medial universe.

Mediology, compared to media theory, complicates and problematizes. With respect, instead, to analysis attentive only to the human side of media interactions, it holds together the material pole and the social or institutional one. It pays attention to how techniques (both human and mechanical) modify the space and time of human beings[73]. It is situated in a trans-historical dimension, which considers medial and cultural transformations in a long-term perspective, without limiting the study of media to a sociology of "new" media.

To give an example of this analytical attitude, one could take Debray's criticism of McLuhan's motto – in this chapter quoted and somehow "defended" – according to which *the medium is the message*. While criticizing its confusion and superficiality, Debray does not "throw it away": he analyzes it, complicates it, and arrives anyway to the conclusion that the transmission of a content is inseparable from one or more supports and that the message depends on its vehicles (material and institutional) and the symbol on its support[74].

His criticism is based on the detection of an analytical distinction that he considers important: there is a separation between the logic of the message[75] (symbolic) and that of the *medium* (technical)[76]. In reality, as will be seen in the next chapter, this distinction only holds up if a rather broad definition of medium is given, like the one given by Debray, and not a narrower one, according to which the

71 Cf. R. Debray, *Le Pouvoir intellectuel en France*, Ramsay, Paris 1979.

72 Cf. Id., *Introduction à la médiologie*, PUF, Paris 2000, pp. 52-61.

73 Cf. *ibid*., p. 39.

74 Cf. *ibid*., pp. 33-42.

75 Although the distinction between a purely material technical "logic" and a proper – or symbolic in the broad sense – logic can be correct, when Debray defines the characteristics of the message, he actually assigns three characteristics that could very well be considered as media characteristics: the message is vocative, prescriptive, and pragmatic (cf. *ibid*., pp. 34-35). As we shall see, media are also phenomenologically intentionate, they are always aimed at one or more purposes and therefore "appeal", address realities external to them; they are prescriptive to the extent that, in order to function, they need other elements of the system to collaborate with them and thus send instructions or influence behavior; they are performative and operational.

76 Cf. *ibid*., p. 43.

medium is already a techno-logical object, which holds together a technical-material component and a procedural one. Nevertheless, the conceptual separation between these two dimensions remains important also in relation to the very functioning of media as media.

Mediology, moreover, satisfies the need for environmental analysis, a virtue that appeared in the philosophy of information, but, rather than talking about the infosphere, Debray prefers to introduce the category of *mediosphere* (*médiasphère*), which includes not only the contents transmitted, but also the material supports and institutions that are shaped by the transmission of information and/or that make it possible.

The mediosphere concept «is totalizing no more nor less than that of biosphere»[77] and allows to define both the totality of the medial environment in trans-historical terms, and the transitions from one medial regime to another (from the mnemosphere to the logosphere, from the logosphere to the graphosphere and from this to the videosphere)[78], caused first of all by *technical revolutions* that bring with them *socio-political repercussions*[79]. The change of medial regimes within the mediosphere therefore corresponds to institutional changes, to the modification of social dynamics, to the mutation of relationships with the environment, and also to a different way for human beings to conceptualize themselves and the world around them.

Mediology, therefore, seems to provide an ideal conceptual apparatus to carry out the task that this text has assigned itself in the introduction. Then why did I mention the need for *philosophical* mediology? Surely there are differences between the approach that will be followed below (some of them will already be seen in the next chapter) and Debray's approach, but there are deeper theoretical motivations to separate a philsophy understood as mediology from the work of the French author.

First of all, it must be said that Debray does not understand mediology as philosophy, nor as a branch of it. Mediology is a particular discipline. It is defined by its founder as a «critical worksite» in which «the conditions of the rise of doctrines»[80] are investigated; conditions found within the mediosphere. This discipline, therefore, is not semiotic, since it looks at the technical, material, and mechanical conditions of symbolic expressions, not at these isolated symbolic expressions[81]. It is not psychology, as it does not believe that mental mechanisms can be isolated from media and *milieux*[82]. It is not sociology, both because sociology tends to present itself as a theory of industrial and post-industrial society, while mediology wants to assume a trans-historical perspective[83], and because «sociology has no regard for objects, and stubbornly ignores technical variables»[84]. It is not (only) pragmatism, since the latter confines itself in the analysis of language, while

77 *Ibid*., p. 45, my translation.
78 Cf. *ibid*., p. 44.
79 Cf. *ibid*., p. 46.
80 *Ibid*., p. 181, my translation.
81 Cf. *ibid*., pp. 144-145.
82 Cf. *ibid*., p. 149.
83 Cf. *ibid*., pp. 149-150.
84 *Ibid*., p. 150, my translation.

mediology also wants to include a historical perspective and technical knowledge[85].

Debray seems more inclined to relate mediology to history and, in particular, to *cultural history*. It «belongs to history, but it is a cultural history *sui generis* [...], an original and autonomous branch, but not independent, from the central trunk»[86]. But if history is seen by Debray as an essentially empirical science, the task of mediology will be to theoretically reconstruct empirical cases[87]. It is not linked to particular case studies or historical periods, but can also move with «a greater freedom of theoretical imagination»[88], with «a certain acrobatic, heuristic, and synthetic fantasy»[89]. In other words, Debray's mediology is characterized as a cultural history of the material and institutional conditions of cultural transmission. It is a kind of metatheory of cultural transmission.

The enterprise proposed in this essay, on the other hand, is of a different nature. In our case too, mediology should be understood as a metatheory, but not in the sense of a metatheory of history, or a metatheory of some particular discipline. It is consubstantial with philosophy because it is the most proper form of contemporary philosophical thought, a science of the middle, of the interstice, of the interface. Mediology in its philosophical sense – or philosophy in its mediological sense – is a metatheory not because it is above the other sciences, but because it stands in the midst of them, mediating between them, studying the media, the mechanisms of mediation, the interfaces and proposes itself as an interface between the parts of culture as much as of being itself.

Here too, philosophical mediology differs in part from Debray's: while the latter focuses on mediation as the transmission of cultural forms, philosophical mediology seeks to recognize and thematize the processes of mediation within every phase shift of being.

Another difference lies in the fact that philosophical mediology, while having an analytical and descriptive part, does not renounce a certain normative claim: it is not only a question of reconstructing *a posteriori* the processes of mediation, the escalation of the media, the condition of mediality; once the intrinsic normative power of the network of medial relations is recognized, the philosophy that wants to place itself within this network, is recognized as an actor and operator, able to propose methodologies for action within the system.

This is because philosophy, even before the phase shift of culture and its fragmentation, has always tried to act in mediation and to reflect on transmission media, including its own transmission media. Philosophy has always been mediology because

> philosophy is the discourse whose object is not external to the discourse itself. This is a direct consequence of the ambition more proper to philosophical discourse, which aims at a form of knowledge without preconditions and absolutely free.
> As a radical form of "metadiscourse", philosophy has a structurally medial character. This not only in the sense that it is a form of "reference" to a veritative dimension that

85 Cf. *ibid*., p. 155.
86 *Ibid*., p. 157, my translation.
87 Cf. *ibid*., pp. 157-158.
88 *Ibid*., p. 158, my translation.
89 *Ibid*., p. 159, my translation.

> is not considered directly accessible, but also and above all in the sense that it is a form of reflection on the possibilities, meaning, and limits of the medium within which it moves, be it thought, language, writing, or the literary genre in which it expresses itself[90].

Philosophy has been configured since its dawn as a discourse *in* the medium (because it is born and remains within a precise medial regime), *of* the medium (because it manages to thematize the essence, the potential, and the limits of this medial regime) and *about* the medium (because, although it moves within it, philosophy tries to make the medial regime its object of reflection)[91]. What we have therefore called *philosophical mediology* is nothing more than *philosophy understood as mediology*.

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In the Simondonian general framework of a general theory of being and culture, the project of a philosophy as mediology is constructed partly as a study of *being* and partly of *ought to be*.

In fact, it will certainly include an *ontological* part, which will be analytical and descriptive and will be characterized fundamentally as a theory of media and mediation. The theory of *media* as media will be more a peculiar part of ontology, a particular ontology focused on a particular type of entities. However, being a *procedural* media theory, it will make it possible to identify the main function of the media, i.e. *mediation*, and to understand that other entities can also sometimes perform the function of media and, above all, participate in the mediation operation.

The theory of mediation will therefore be the part of ontology devoted to investigate the connections and processes that pass through the being and that connect the entities within a reticular structure of actions, feedback, and interactions that, as will be seen, will be called medial condition, or *mediality*.

The recognition of mediality and its different configurations, called *medial regimes*, will be the last object of mediological ontology, but it will also be the starting point, or rather the condition of possibility and the environment of an *ethics* or a *politics* of mediation. Once the intrinsic normativity of a certain medial system is recognized, given its reticular structure that conditions the actions and interactions of each of its components, philosophical mediology can propose a normativity within normativity: once the conditionings and their causes are recognized, a new and more conscious *theory of action* can be elaborated.

This double task, ontological and ethical, theoretical and practical, will be what philosophy understood as mediology must assume within the contemporary medial regime. To do so, it will find its field and its objects of investigation. The present essay, as already mentioned, aims to try to fulfill precisely this first task.

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90 A. De Cesaris, F. Striano, *La filosofia è un discorso pubblico? Medialità e mediaticità del discorso filosofico*, in «Point of Interest», N. 2, I/2018, pp. 102-122: 112, my translation.

91 Cf. *ibid*., p. 105.

II. Media, Mediation, Mediality

A philosophy that aims to reflect on the meaning and limits of a given medial regime must, by necessity, move around objects that will constitute its field of investigation. This work will focus, starting from the next chapter, on an even more particular and absolutely exemplary object of study of the contemporary mediosphere, namely the *interface*; but first it is necessary to establish and describe the founding concepts of philosophy as mediology.

These concepts, for which clear and unambiguous definitions should be provided, are "media", "mediation", and "mediality". For this last term, in particular, I will propose the characterization of "medial condition", which will serve to better understand the potential and risks of interactions between human beings, environment, and technologies.

On the one hand, one might be led to believe that this tripartition is sterile and misleading: perhaps media are not generators of mediation? And what is here called mediality in what differs from a mediation? On the other hand, it could be argued that this partition is arbitrary and that each term hides a greater complexity than it appears at first sight: it is enough to consider the term mediation to see how it can assume different modalities.

Alexander Galloway, for instance, speaks about at least three *modes of mediation*, each with its own particular characteristics and risks. The first is the one that, «*in the most workday sense*», identifies mediation with «extension, transit, representation, reflection, mimicry, and alienation»[1]. This mode, that Galloway identifies with the *hermeneutical* paradigm, «includes both circulation and exchange and the dangers they provoke such as disenchantment, fraud, and deception»[2]. The second – the *iridescent* mode –, indicated as «*pure and true communication*», is characterized by «communion, immediacy, and immanence»[3]. The third represents instead an *infuriated* condition, a «*multiplicity of communications*», a complex and articulated infrastructure that dilates, duplicates, multiplies the junctions of the mediations at stake, thus «extinguishes any sort of middle whatsoever (and with it any sort of media)»[4].

To answer the first objection, it will be said that it is obvious that the three elements taken as objects of study by philosophy understood as mediology are interconnected, but that, at the same time, they represent three different facets of the mediological problem (the procedural one, the objectual one, and the multiplicity one). Moreover, to say that media *generate* mediation does not mean that they *are* mediation and, as will be seen, mediality in turn cannot be traced back to mere mediation.

1 A.R. Galloway, *Love of the Middle*, in A.R. Galloway, E. Thacker, M. Wark, *Excommunication. Three Inquiries in Media and Mediation*, The University of Chicago Press, Chicago-London 2014, pp. 25-76: 28.

2 *Ibid.*, pp. 28-29.

3 *Ibid.*, p. 29.

4 *Ibid.*

Coming to the second objection, on the other hand, it will be said that there is no desire to sacrifice complexity at all, but, precisely in order to ensure that it does not overwhelm us, we will have to try not to confuse contiguous, but distinct concepts: for example, it will be attempted to show how what Galloway calls "modes of mediation" are in fact the respective ways in which media, mediation, and the medial condition present themselves.

1. Media.

Although, as said, philosophy as mediology is not simply media theory and should not therefore deal exclusively with them, it cannot, however, disregard an accurate analysis of the media, their effects, their relationships with the components with which they are interconnected (human beings, environment, other media).

In any case, to clear the field from a first possible misunderstanding, it should be made explicit that a media philosophy should not deal (or at least not primarily) with mass media, nor should it confuse the medium with its content. The first ambiguity to unravel, therefore, is this: by "media" we are not referring to mass media, but to objects endowed with their own specific materiality and function.

Normally we tend to define as media all those communication channels through which news, entertainment, education, data, or promotional messages are disseminated. So, by extension, the term refers to components of the mass media communications industry. However, sticking to the strictly technical meaning, we will say that a medium is a means for the transmission or storage of information. Even in this case, however, the definition seems vague: it is difficult to calculate its precise extension, which could range from channels to supports, from conservation techniques to production techniques.

The definition that will be proposed here is, actually, rather restrictive: a medium is defined as a *techno-logical object aimed at mediation*, endowed with a *shaped materiality* (technical) and *functional schemes* or *codified modes of use* (logic)[5].

1.1. Media and channels.

By this definition, first of all, it is intended to distinguish rather clearly the function of the medium from that of the means, i.e. the *channel*. Although the channel, in fact, is an indication of the presence of a mediation or, at least, of its possibility, it does not possess the degree of autonomy and the logical factor that characterizes a medium in the proper sense.

Basically, it is about distinguishing between the medium and the μεταξύ. In both cases we are faced with something that allows operational mediations[6], but the difference lies in the fact that the second is only a means, whereas the first contains, as was said, a technical dimension (the dimension of use) and a logical one.

5 It is worth specifying immediately that "functional scheme" means a material arrangement that allows the medium to function as such and gives it an *inner purpose* (this concept of inner purpose will be clarified further *infra*, p. 143). "Coded mode of use" means a material arrangement of the object that already contains instructions for any user who may need to use it.

6 Cf. E. Alloa, *Metaxu. Figures de la médialité chez Aristote*, in «Revue de Métaphysique et de Morale», No. 2, *Méthode et interprétation à l'âge Classique* (Avril-Juin 2009), pp. 247-262: 249.

The μεταξύ is what, according to Aristotle, mediates perception, what guarantees a distance and heterogeneity between the sense organs and the medium, both necessary in order to have perception[7] (perception is perception of a difference and, at least in the cases of sight and smell, of a distance). Such μεταξύ must therefore have «a certain density or "texture"»[8], for there to be passage and mediation; must, in other words, provide a certain amount of resistance, which guarantees the information a direction. This description of one of the figures of mediality in Aristotle fits perfectly with the notion of channel, i.e. a way of communication or propagation of a signal[9], but it does not address, or in any case does not fulfil the function of the medium: the channel is a material object (natural or artificial) that makes mediation possible, but it can neither generate it nor modulate the intensity of the information, since it does not have the necessary independent logical schemes.

The medium, unlike μεταξύ, has a double functional "essence"[10]: it has a static component (the logical schemes) – but still aimed at a functional dynamism – and a dynamic one (the technical use). In this sense, the essence of the medium (what makes it properly medium) is its function, even if the medium does not identify with it, since it is also matter and not only functionality.

In a certain sense, the medium can *also* be μεταξύ, provided that the function of the μεταξύ is incorporated, as will be proposed below, in the semantic field of the French term *milieu*. The important thing is that the medium is not entirely identified with the μεταξύ, also because such an identification would pose the problem of a *regressus ad infinitum*: If we understood as a medium simply what, in a mediation process, is in the middle of two terms (which would represent the extremes of the process) and that is necessary for these terms to connect, then we should ask ourselves what connects the first term with the medium, then what connects this second-order medium with the first medium and the first term and so on. Conversely, as we shall see, "what is in between", using channels of various kinds, but remaining independent from them, is the *mediation process* itself, while the media play a precise role in relation to it (and not to its terms, being themselves terms, or *terminals*).

7 Cf. *ibid.*, p. 256. See also *De anima*, II, 11: 417b26 ff; Aristotle, *De Anima*, tr. en. M. Shiffman, Focus Publishing, Newburyport 2011, pp. 60 ff.

8 E. Alloa, *Metaxu. Figures de la médialité chez Aristote*, cit., p. 256, my translation.

9 Cf. C.E. Shannon, W. Weaver, *The Mathematical Theory of Communication*, The University of Illinois Press, Urbana 1964, p. 34. Shannon actually calls the channel «merely the medium». This is because, with improper lexical use, it considers synonyms "medium" and "means". The aim of this section is, instead, precisely to dismantle this synonymy.

10 Some, such as Lisa Gitelman, for example, might criticize an *essentialist* definition of media. Caution must be exercised, it's true, but not for the reason given by Gitelman: the problem is not that essentializing the medium leads to assigning it an agency (cf. L. Gitelman, *Always Already New. Media, History, and the Data of Culture*, The MIT Press, Cambridge-London 2006, p. 2), since – as will be seen in the chapter V – as long as the agency is understood in a more neutral and not anthropocentric sense, it is not a problem (and it might even be necessary) to consider media as actual agents; the problem lies rather in the way the word "essence" is understood. If by it is meant something static, external and anterior to the object, and that over-determines it, then the word risks leading us astray; if, however, it is understood in an operational sense and as a descriptive set of all the characteristics that make a medium such, then its use is justified. However, it is preferable to leave the word in quotation marks.

To remain on the figures of mediality in Aristotle, then one should say that the medium has more similarities with the μέσον (the middle term of syllogism, the logical intermediary)[11] than with the μεταξύ. The μέσον is in fact the operator who seeks and helps to create a new order of compatibility between opposite, but not contradictory terms[12]. The medium, like the μέσον, operates in the intervals[13], not because it has to "occupy" them (otherwise one would still fall back into the *regressus ad infinitum*), but because it is in the intervals that mediation – that must be maintained and propagated – takes place: it operates in *at least* two intervals (between itself and the terms connected, but also between them and the environment, and between various other terms that may be interconnected in a complex network).

Another point that the μέσον has in common with the medium as here we are trying to define, is the fact that it tends to *eclipse* itself at the conclusion of the process[14]: this means that the better it performs its function, the less invasive it is, the more it manages to remain invisible in its work. This, as will be seen in the following chapters, is an issue exquisitely related to interfaces and their work.

However, the work of the μέσον contains an intrinsic ambiguity: on the one hand it is the «intermediate state of a continuous movement», on the other hand it is the «approximation operator of two discontinuous elements»; but it can also be seen as that which, while connecting, maintains a distance and is therefore «an obstacle on the path of rapprochement of the two terms»[15]. Such ambiguity also belongs to the medium, but this, as will be seen subsequently, depends on whether or not the medium has access to an *optimal medial condition*.

These formal analogies, however, should not blind us to the fact that we can only treat the Aristotelian μέσον as a *figure* of mediality: it can help us understand how a medium *works*, but it lacks the material component that we have included as necessary in our definition, which ensures that functional schemes have an effect on physical reality. In other words, we can say that the μέσον performs, on the logical level, the same function that the medium performs on the medial one.

1.2. Media in the proper sense.

To get back to our definition, it will be noted that it only includes artifacts with a certain codified function and this can appear extremely reductive if we think about the fact that even natural elements can act as media (or, at least, as channels), such as the air that transmits the voice, or the voice itself. However, the intention is to

11 See *Analytica Priora*, 53a5 ff.; Aristotle, *Prior Analytics*, tr. en. R. Smith, Hackett, Indianapolis-Cambridge 1989, pp. 65 ff, and *Analytica Posteriora*, 71a1 ff.; Id., *Posterior Analytics*, tr. en. J. Barnes, Clarendon Press, Oxford 1994, pp. 1 ff.

12 Opposition, in fact, is not a contradiction, but a confrontation of different orders of compatibility, which can be put into communication through the discovery of a new order. «The contradiction – on the other hand – excludes any passage from one to the other» (E. Alloa, *Metaxu. Figures de la médialité chez Aristote*, cit., p. 250, my translation).

13 Cf. *ibid.*, p. 251.

14 Cf. *ibid.*, pp. 251-252. By "eclipse" here Alloa means that in a syllogism of the type (I) all A are B; (II) C is A; (III) then C is B, the middle term function is assumed by A (particular occurrence of the universal "all A"), who, after having fulfilled his fundamental mediation function, disappears in the conclusion.

15 *Ibid.*, p. 252, my translation

distinguish objects that are media from those that can temporarily assume the function of media.

If, as said, the essence of the medium is its function, it will be admitted that a *medium in the proper sense* is such only when it is in function. And here lies an important difference between media and objects that assume the function of media: the non-operating medium is not another object, but an inert object. However, certain factors must be taken into account: (i) the non-operating medium, reduced to an inert object, does not take on an alternative function *that is its own*, therefore remaining *unused* or *improperly used*, but still identified as a "broken" medium that acts as something else only because it is *unable* to exploit the logical functional scheme that would predispose it to mediation[16]; (ii) although the medium is aimed at its own operation, it should not be confused with it (therefore, the media should not be confused with the mediation processes made possible by them), because (ii a) a medium can be operational without mediating, perhaps for lack of favorable environmental factors, or (ii b) can carry out several mediation operations and cannot therefore identify with one of them in particular; (iii) moreover, as will be seen below, there can be mediation even in the absence of media (in the strict sense proposed here).

As mentioned above and reiterated in point (iii), some objects could *serve* as media, even without having the proper logical-material structure, and be used *as if* they were media: a functionality and a functional scheme are inserted in them by another agent and allow them, in that particular circumstance, to generate mediation. A tree on which are engraved the initials of two lovers or the moss grown on the side of a rock used as a device for orientation are examples of natural objects used temporarily as if they were media; a bottle containing a message and left at sea in the hope that someone will find it or a flashlight used to exchange Morse code messages at a distance are examples of technical objects which are not media (but have other functions – in this case contain liquids or illuminate in the dark), but are sometimes used as media.

To underline the fundamental difference between objects that *are* media and those that *serve* as media we could say this: the broken medium, inert or improperly serving as something else, is a *diminished medium* – taking on another function is a degradation; the object that serves as a medium, on the other hand, acquires a new function that does not delete the previous ones and is therefore an *enhanced object*.

1.3. The body as a medium?

More complex is the question of living bodies and their role in mediation processes:

16 One can also imagine a scenario in which a medium is found by individuals belonging to a community that knows nothing about the techno-logical schemes that serve to finalize objects to the generation and preservation of mediation: in this case they could use a medium, even if it is fully functional, in an "improper" way. One would therefore be tempted to say that is *culture*, and not techno-logical schematism, that provides the medium with its essence. It must be admitted, however, that those individuals who find the above mentioned medium will hardly ignore the fact that it has components whose function they do not understand: somehow, even if they do not know how to use it, they will know they are using it improperly. Moreover, the medium will always contain the possibility to instruct, through a work of reverse engineering, anyone who places him/herself with the intent to give it back its most proper function.

they are, undoubtedly, natural objects, they can carry out finalized behaviors and therefore act, in a sense, as artificial objects (their materiality could even be shaped) and certainly have a role or give rise to mediation processes. But can they be called media? Are they enhanced when they perform a mediation function, or is this function, without being the most proper, already part of the range of possibilities inscribed in them?

It is undeniable that often the body or some of its parts serve and act as media. Suffice it to think of the phonic apparatus, able to articulate sounds that can become information, but also body language, body painting, etc.. However, it is not only in these cases that the body assumes a medial function: it is or can be a *source* of media, or even a *prototype* for the media.

Well known is the Mcluhanian thesis, already explained in the subtitle of *Understanding Media*, according to which the *media are extensions* of the human being. The Canadian media theorist inaugurated the *prosthetic conception of media* and, in doing so, while beginning, as mentioned in the previous chapter, the tradition of studies that places the medium as a medium at the center of his analysis, he also gave the body (understood both as an individual body and as a social body) a cardinal role. According to McLuhan every mechanical technological means has constituted, over the centuries, an ever new and more functional extension of the human body, while contemporary (to him) electronic media would have gone in the direction of «the *final phase of the extension of man* – the technological simulation of consciousness, when the creative process of knowing will be collectively and *corporately extended* to the whole of human society»[17].

According to this prosthetic conception, the body is not only the inert matter that is extended by the media, but is a *prototype* for its prostheses: language (the spoken word) is an extension of consciousness and allows it to "move", in abstraction, from one thing to another «with greater ease and speed and ever less involvement»[18], becoming to the consciousness what the feet are to the body and the wheel is to the feet; the written word, in turn, becomes a visual extension of the spoken word,[19] and so on. As can be seen, according to McLuhan, prostheses proceed uninterruptedly from the body to the artifacts, always having as a model the

17 M. McLuhan, *Understanding Media*, cit., p. 3, italic mine.

18 *Ibid.*, p. 86.

19 Cf. Cf. *ibid.*, pp. 88 ff. The processes of externalization can then also lead, as will be said in the next chapter, to new internalizations. With regard to the passage from orality to writing mentioned here, Ong's observations (cf. W.J. Ong, *Orality and Literacy*, Routledge, London-New York 2012, pp. 11 ff) on the so-called second orality should be considered: after the Gutenberg parenthesis (cf. L.O. Sauerberg, *The Gutenberg Parenthesis. Print, Book and Cognition*, in «Orbis Litterarum», Vol. 64, Issue 2 (April 2009), pp. 79-80), a stage of second orality prevails, which, however, is based on the standardized forms of literary culture. The examples of the television anchorman or radio speaker reading written news are quite typical, but precisely these could lead one to think that this new orality consists in a parenthesis, close to the end, before the advent of a digital scripturality, a scripturality of the code. However, even this would not be entirely correct, since the digital culture seems to qualify itself as a visual-oral culture, based entirely on a written and universally accepted code, just as in the second orality theorized by Ong, with the difference that the latter would be, according to the author, «a more *deliberate and self-conscious* orality» (W.J. Ong, *Orality and Literacy*, cit., p. 134), while in the digital age the acceptance of information language does not always correspond to its mastery, to a deliberate internalization, or to an active knowledge and manipulation of it.

element to be extended and as a target to overcome it in performative terms.

In addition, it should be noted that the medium retroacts on the extended body. On the one hand it strengthens the part that is extended, giving it possibilities that were previously precluded, on the other hand it makes the body part superfluous, anesthetizes it: the wheel makes the feet "obsolete", or, to return to the previous example, the spoken word extends the human being, but divides its faculties, reducing its collective consciousness and intuitive awareness[20], while the written word, in turn, allows a great amount of information to be recorded, thus relieving the memory of this task and, therefore, weakening it[21]. The Narcissus who falls in love with his extended part, narcotizes himself, numbs the body function that gave rise to that part[22].

This prosthetic logic, as will be discussed later, does not exhaust the nature, development and function of media and technical objects in general, but it certainly helps us to thematize a first important connection between media and body: the body is or can be the source and model of the media, and the media act retroactively on the body. What remains to be said, however, is that the body itself can be medium or, more precisely, a *proto-medium*.

This notion of proto-medium is derived from Mauro Carbone and should be understood in a double meaning: the body is both the *first* medium and, once again, the *prototype* of subsequent media. Meaning with "medium" something much more generic than the strict definition you are trying to find in this section[23], Carbone sees in the body the first medium through which we enter into communication with the world and therefore as the first medium that allows and, at the same time, shapes and directs the perception of what is outside us.

With respect to the project pursued in this work, Carbone's thesis is problematic from at least two points of view. First of all, it *seems* to imply that the human being is essentially something other than its own body: if the body is the medium, understood as the medium between the human being and the world, then the human being is not the medium, but one of the terms using the body-terminal. However, one must not believe that Carbone proposes a relapse into a sort of mind-body dualism. Rather, he believes that the body, even though it is no "other" with respect to the human being, can *express* more than itself, an "exceeding" that represents an *express* that finds *expression* in the body. This conception of the body as an "expressive space" is very useful to frame the body in a context of medial connections, even if, in my opinion, as I will say shortly, it does not make it totally

20 Cf. M. McLuhan, *Understanding Media*, cit., p. 86.

21 Cf. *Phaedrus*, 275a-275b; Plato, *Phaedrus*, tr. A. Nehamas, P. Woodruff, in Id., *Complete Works*, eds. J.M. Cooper, D.S. Hutchinson, Hackett, Indianapolis-Cambridge 1997, pp. 506-556: 551-552

22 Cf. M. McLuhan, *Understanding Media*, cit., pp. 45 ff.

23 The definition that Carbone gives of medium is that of an «element through which, and thanks to which, we are related to the world» (M. Rebecchi, *Una Filosofia-schermi. Intervista a Mauro Carbone*, in «Il lavoro culturale», 7 September 2017, retrieved from https://www.lavoroculturale.org/una-filosofia-schermi-per-lepoca-degli-schermi-mondo/, accessed 20 March 2020, my translation) and is put in explicit correlation with Merleau-Ponty's notion of "flesh" (cf. M. Merleau-Ponty, *Eye and Mind*, tr. en. C. Dallery, in Id., *The Primacy of Perception and Other Essays on Phenomenological Psychology, the Philosophy of Art, History and Politics*, Northwestern University Press, Evanston 1964, pp. 159-190).

(or exclusively) adherent to the definition of the medium in the proper sense[24].

Secondly, to conceive the medium as something that opens the human being to the relationship with the world ties us to a slightly too anthropocentric notion that the medium is always medium-for-human. As will be increasingly clarified later on, one of the aims of this work is to de-anthropologize the discourse on mediality and to frame it in a systemic perspective, within which no ontological or epistemological preeminence is attributed to any of the components involved, so that the analysis can be extended not only to human-media relations, but also to media-machines, media-media, media-environment and so on. As far as this section is concerned, then, the intention is to define as far as possible the medium *per se* and not the medium for anything else.

Nevertheless, despite these concerns, the thesis of the body as proto-medium helps to frame the mediality inherent in (not only human) corporeality and in the senses: the senses condition access to the world, make possible and limit perceptions at the same time; certain brain or body configurations shape perception and conceptualization; the body collects, transmits, and prolongs information, gives shape to other entities; it acts as a communication tool with the environment and other agents.

The body therefore sometimes serves as a channel, sometimes as a medium, in any case it is traversed or produces processes of mediation. Yet it seems to escape the given definition of medium. This could mean that the definition needs to be widened, but the risk would be to come up with a definition that is too wide, not able to identify precise objects with a precise function, with the risk of leading to the conclusion that if (almost) every object can act as a medium, then (almost) everything is (at least *also*) a medium.

Reformulating with other words the first definition, we can say that *a medium is a technical object* that originates *from a creative gesture* and that *has the general function of directing, propagating, modulating processes of mediation*, but that, by virtue of its specific design, *acquires a relative autonomy*. In the case, then, of (natural or technical) objects that *serve* as media, we are dealing with objects without autonomy or with autonomy directed to different purposes, which are *momentarily enhanced* so as to perform the function of media. The body seems to escape both cases, since on the one hand it is not a created artificial object, on the other hand it does not seem to need some external insertion to perform the above mentioned medial actions.

In a certain sense one could say that the body is *more than a medium*, since it

24 This conception of corporeality in Carbone derives from a Merleaupontian background. The example made by Merleau-Ponty (and derived from Proust) of the body as a "support" that can reveal something *more* than itself – hiding itself, but not disappearing, nor lending itself as a mere intermediary to an "other" essence – can be that of the actress Berma who plays Racine's Phaedra: she "becomes invisible" so that the character can appear (cf. Id., *Phenomenology of Perception*, tr. D.A. Landes, Routledge, London-New York 2012, p. 229). On the basis of these Merleaupontian pages, but also a passage by Hans Belting (according to whom the medium shoud be «understood in the sense of a carrier or host medium» of an image, H. Belting, *Image, Medium, Body: A New Approach to Iconology*, in «Critical Inquiry», Vol. 31, No. 2 (Winter 2005), pp. 302-319: 304), Carbone formulates its own definition of medium, certainly wider than the one I am trying to defend here: «a medium is a *perceptible* that shows and hides at the same time and by virtue of this establishes relationships and makes communication possible» (M. Carbone, *Re: Charimenti*, message to Francesco Striano, 1 April 2020, email, my translation).

performs its function (which is not the only function it performs) even without having been designed for this, but also that it aims to build media that have as a model itself, but with the purpose of overcoming itself: the medium, in fact, should serve *more and better* to generate mediation processes and also to mediate between the body itself and other bodies, other media, environments, and systems.

Hence the transition from proto-medium as first medium to proto-medium as prototype is clear. Also Carbone, in his analysis of the screen experience, identifies in the body the proto-screen as well as the model of the following screens. The Italian philosopher, dwelling on the original dual function of the screen – on which we will dwell in the chapter on aesthetics –, that is, on its being both the showing and the shielding surface[25], notes that these functions are performed primarily by the body[26]. The body, then, can externalize the above mentioned functions (double and ambiguous) in external devices[27] and so it serves as a model, but it contributes to make the externalization operate in a deferred way, autonomously, and better than the body itself. An example of this mechanism can be that of the screen, suggested by Carbone, but also that of the telephone which initially serves as an extension of the voice, but then allows, in conjunction with other means, such as a recorder, to make human beings interact with recorded voices (a sort of deferred human-human interaction); in the age of voice synthesizers, then, without even needing a telephone anymore (but always through acoustic sensors and speakers) it is possible to interact with artificial voices produced by voice synthesizers, which serve as sound interfaces between human beings and machines.

In essence, the body is neither a medium, nor an object that serves as a medium: it is perhaps *also* a medium, it can be its prototype and source and, although it can be narcotized or surpassed in performance by media, it continues to play a medial role. It is probably a *sui generis* medium, or even better, a *proto-medium*, but, although it will often be discussed in relation to media, the body will not be the main object of a media theory.

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25 Mauro Carbone identifies a manifestation of the *arche-screen* – i.e. the trans-historical reflection of the screen experience and of the general features inherent in the different devices we call screens – in Plato's allegory of the cave, where there is a screen used as a viewing surface (καταντῐκρύ, the opposite wall), as well as a small wall (τειχίον), used as παράφραγμα, as protection from what happens behind the prisoners, and several other objects, as well as the bodies of the prisoners themselves, which, by momentarily shielding the light source, produce shadows (cf. M. Carbone, *Filosofia-schermi. Dal cinema alla rivoluzione digitale*, Cortina, Milano 2016, pp. 102 ff). From Plato's mythical tale emerges the inseparability between a *negative screen* (which shields and, therefore, produces the shadow) and a *positive screen* (which shows and presents the shadow). (cf. *ibid.*, p. 104).

26 Still Carbone underlines how the double function of positive and negative screen are co-present in the body, which presents itself as a visible object, but it can also intercept a light source thus covering what it has behind it, projecting (and therefore showing) at the same time its shadow on other surfaces (cf. Id., *Dei poteri dell'archi-schermo e dell'ideologia della "Trasparenza 2.0"*, in «Between», VIII.16, 2018), as it happens, for example, in the myth about the origin of painting (cf. *Naturalis Historia*, XXXV, 15 ff; Pliny the Elder, *Natural History, Volume IX: Books 33-35*, tr. H. Rackham, Harvard University Press, Cambridge 1952, pp. 271 ff).

27 «The *ambiguity of the body extends into that of the screen*» (M. Carbone, *Dei poteri dell'archi-schermo e dell'ideologia della "Trasparenza 2.0"*, cit., my translation).

1.4. Media and their function.

As said so far, the word "media" has a certain ambiguity in common language: it can be used to indicate mass media, their content or the whole apparatus that supports or survives thanks to them, the transmission or communication channels, other objects that can sometimes perform a medial function. In this section an attempt has been made, by subtraction, to delimit the field of what, philosophically, we should consider as media. But one might ask: does this restriction make sense or is it simply arbitrary?

The fact is that mediation, as will be seen in the next section, is a process that is partially independent of the entities that instantiate it, but uses objects in order to be prolonged, preserved, perpetrated, modulated, or intensified. These objects are divided into objects that perform such functions occasionally and objects that have the specific (though not entirely determinant) function of medial operators. In order to avoid any ambiguity, only objects belonging to this second class are defined as media and this allows us to isolate their specificities and to identify the peculiar relationships that bind them to the environment and to other individuals placed in a medial context.

Within this restrictive definition, it can be recognized that the proper function of these techno-logical objects aimed at mediation that we call "media" is to *store*, *process* or *transmit* information[28]. The concept of information is central to the mediation process, as will be seen, and the media are precisely those objects that have the function (through storing, processing, or transmitting) of *transforming data into information*.

Media mediatize data, translate them into information, make them "understandable" even within different systems, allow them to express their potential and generate new forms. This process, this translation of data into information, should be framed within a discussion on mediation, which will be carried out in the next section. At this point, suffice it to note that storing as well as processing or transmitting consists of ways of working with data and information: to store means to receive information, translate it and "crystallize" it into data to be retained until further use; to process means to perform, within the medium, operations that retransform data into information, which enables to restructure the medium itself, translate data in such a way as to make them perceptible to other elements of a medial system, collect further data, etc.; to transmit means to transform data into information in order to send it to other devices, to create copies of them within other devices.

As has been said repeatedly, media are technical objects, but this does not fulfil their definition, since the logical component contained in them is expressed precisely through the functions indicated above. According to the Simondonian definition, a technical object «defines a certain crystallization of the human creative gesture and perpetuates it in being [...] it mediates the human effort»[29]. A medium does the same thing, but it doesn't just crystallize a *gesture* so that it always repeats itself: it crystallizes a logical scheme, an *algorithm*, in order to *prolong* the gesture, to

28 Cf. F.A. Kittler, *Optical Media. Berlin Lectures 1999*, tr. A. Enns, Polity, Cambridge 2010, p. 26.

29 G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., p. 512, my translation.

reverberate it, to make it always and again creator, so that it adapts to different situations and can work with new data and information.

Remaining in a simondonian framework, however, it will be noted that the medium, as a technical object, has an *associated environment*. Media can be counted among what Simondon calls *concrete* or *naturalized* technical objects[30]. What Simondon theorizes is that the act of invention always realizes not only the object, but also the environment associated with it, just as, on a perceptual level, in psychic individuation, the individual and the environment are individuated opposing each other. Both the psychic and the technical individual are always associated with an environment. The environment of the concrete technical object – and therefore also of the medium – presents itself as the mediator between fabricated elements and natural elements[31]. In this sense, the medium realizes mediation also through an *environmental mediation*: it fits into an environment, structures it, creates it, and, through this, propagates information and gives rise to mediation processes.

The medium, therefore, also includes an environmental element that can act as a channel, but it is not so much μεταξύ, rather a *milieu* of diffusion. The French word *milieu*, in fact, presents a semantic richness that seems to respond well to the variegated characteristics of the medium: it is a word composed of *mi* ("middle", from the Latin *medius*) and *lieu* ("place", from the Latin *locus*) and can mean environment, context, middle point, medium. Citton, reworking Benjamin's conception of medium, defines the latter as a perceptual *milieu* (*milieu de perception*), which connects and makes bodies and (natural) environments act on each other through circular mechanisms that involve attention and action[32], and on which we will have to focus in a few chapters.

1.5. Media and "new" media.

The definition of media as techno-logical objects aimed at mediation, even including this last "environmental" concept, remains restrictive as promised. It is restrictive, yes, but also general: in fact it manages to include "old" and "new" media. But the question that needs to be addressed here is this: does it make sense to distinguish between old media and new media?

First of all it is necessary to understand whether this label of novelty should be understood in a temporal sense or with an epistemological meaning. In the first case the "new" media would simply be the media of the moment, the most recent ones, according to «the truism that all media were once new»[33].

If, on the other hand, one wants to imply that at the basis of the legitimacy of the epistemological break between old and new media there is a motivation of radical technological difference, then one will have to address theoretical elaborations such as those of Manovich or Kittler and it will be necessary to test their solidity.

30 By this is meant technical objects that include circular causality regimes typical of natural entities and that do not need controlled artificial environments, since they can fit into natural environments, interact with them and "conquer" portions of them (cf. Id., *Du mode d'existence des objets techniques*, cit., pp. 56-58).

31 Cf. *ibid.*, p. 70.

32 Cf. Y. Citton, *Médiarchie*, Seuil, Paris 2017, pp. 48-49.

33 L. Gitelman, *Always Already New*, cit., p. 1.

To be precise, Kittler's thesis does not even concern so much "new" media, but rather the disappearance of the very concept of medium, dissolved in the computer, which is the medium that sums up all the media and the whole history of media[34]. This "end of history" rhetoric seems to be looking forward to a future of total harmonization of the medial system and media with humans[35], although perhaps the anti-humanist Kittler's perspective remains more that of the *erasure of humans*[36].

The aforementioned rhetoric is also evident in the messianic expectation of the advent of *singularity* on the part of the transhumanists[37], according to whom media and technologies in general have now passed the point of no return: new media are so "new" that they can only be the last, those after which there can be nothing more than improvement, refinement, and harmonization of the existing. It is curious that the very theorists of the possibility of machine agency[38] have such blind faith in teleological linearity that seems to exclude any unpredictability on the part of the media.

The prophecy of the end of the media, however, does not seem to rest on solid foundations. First of all, according to Kittler's own theories, this would not be the first time in history that a medium manages to summarize every other[39], so it is not

34 Cf. F.A. Kittler, *Gramophone, Film, Typewriter*, tr. G. Winthrop-Young, M. Wutz, Stanford University Press, Stanford 1999, pp. 1-7.

35 Cf. L. Gitelman, *Always Already New*, cit., p. 3.

36 Kittler's media history «is a grand narrative whose vanishing point is nothing less than human obsolescence» (G. Winthrop-Young, *Kittler and the Media*, Polity, Cambridge 2011, p. 78).

37 By "technological singularity" is meant the point after which technological advances will become unpredictable for the human mind. Often in futurology this point corresponds to the advent of a higher intelligence, the result of the integration between human and artificial intelligence, and to the cascading advances that should result from such an advent. The best-known prophet of the singularity, Ray Kurzweil, predicts that this point will be reached around the middle of this century. Its prediction is based on a generalization of Moore's law, which describes an exponential trend in the growth of the complexity of semiconductor integrated circuits, tending to an asymptote. Although performance growth seems to have slowed dramatically since 2000, Kurzweil argues that the law should be refined to include technologies that predate integrated circuits and should be extended to future forms of hybrid technology (cf. R. Kurzweil, *The Law of Accelerating Returns*, in C. Teuscher (ed.), *Alan Turing. Life and Legacy of a Great Thinker*, Springer, Berlin-Heidelberg 2004, pp. 381-416: 391 ff). The point of arrival, the end of history, in his vision coincides with the sixth epoch, namely the one in which expanded human intelligence (mainly in non-biological form) will permeate the entire universe (cf. Id., *The Singularity is Near*, cit., p. 34).

38 Lisa Gitelman criticizes the tendency «to essentialize or grant agency to technology». In her opinion, a medium «doesn't squint around on its own except in a metaphoric sense» (L. Gitelman, *Always Already New*, cit., p. 2). It is possible to accept criticism of those attitudes that, in attributing an "essence" to the media, forget the element of external project planning. However, this criticism in no way undermines the idea of a media agency. On the contrary, the idea of such an agency is defensible only if one assumes a *non-essentialist perspective*, as we tried to say in the introduction. As regards, however, the idea that an artificial object cannot acquire autonomy, this position has already been criticized in section 1.3. of this chapter. Gitelman's perspective is spoiled by a concept of agency that takes the *human agency* as a universal paradigm, while in this work, in chapter V, the idea of a *de-anthropologized media agency* will be defended.

39 According to Kittler the discursive regime of the nineteenth century is characterized by the presumed unity: unity of the subject, unity of the continuous flow of cursive handwriting (cf. F.A. Kittler, *Discourse Networks 1800/1900*, tr. M. Metteer and C. Cullens, Stanford University Press, Stanford 1990, p. 83), unity of the media and visual and auditory impressions filtered through the symbolic grid of print and of the medium book (cf. Id., *Gramophone, Film, Typewriter*, cit., p. 4).

clear why the digital age should be the last or why a new separation is not possible, if this becomes more functional in a new medial system. It should also be noted that, although of identical physical "nature", the different media manifestations still tend to have a different phenomenological appearance. Not to mention the possible historical, sociological, or culturological discourses on resistance or return of the analog, which will be left aside here.

Manovich's argument is perhaps more subtle and refined, and apparently more detailed. In fact, he aims to identify specific differences, i.e. a «set of formal and poetic qualities identified across all sorts of new media objects»[40], which distinguishes the latter from other previous media and their discursive regimes. Again, the label "new media" might seem inappropriate, unless it is understood as "new media so far". However, even in this case, the underlying assumption seems to be that the *cultural form* generated by this type of media is, in some way, the *ultimate cultural form*.

Already here a first problem emerges: Manovich's conception of medium contrasts with the definition proposed in this text and seems to slip into the trap of the *regressus ad infinitum*, that is the "problem of the middleman". In fact, when he gives a definition of "cultural interfaces" he defines them as *human-computer-culture interfaces*, thus limiting the computer (or at least its analysis) to its *production/coding/transmission of cultural production* (which is mostly understood as the production of aesthetic objects)[41]. Moreover, in what sense is the computer to be understood only as middle term between human and culture? Is it not itself a cultural product? And what then mediates the interaction between human beings and computer?

It would be better, however, not to go into the problem just described and instead focus on the specific differences between new and old media. According to Manovich the characters that differentiate the new media from the previous ones are: *numerical representation*, *modularity*, *automation*, *variability*, *transcoding*.

New media objects «are composed of digital code; they are *numerical representations*», thereby they «can be described formally (mathematically)» and are «subject to algorithmic manipulation»[42]. New media objects have a fractal or *modular* structure: they are made up of a set of parts assembled into a more complex structure, but without the individual parts losing their identity. Not only that: the new media «objects themselves can be combined into even larger objects – again,

Writing, in short, both handwriting and printing, in the pre-Edisionian era, performed the function of a unified medium, capable of synthesizing any other type of medium (a painting, a visual impression, a sound, but even an emotion, a thought can be described). It is only with the era of analog media that different media are dedicated to the measurement, recording, and reproduction of different physical and physiological events: photography captures light and returns visual impressions; phonography transcribes sound waves and reproduces sound; even writing can be analyzed from a scientific and formal point of view through graphology. «In the discourse networks of 1900, the psychophysics and media subvert the imaginary body image that individuals have of themselves and substitute a forthright positivity» (Id., *Discourse Networks 1800/1900*, cit., p. 237).

40 A.R. Galloway, *The Interface Effect*, Polity, Cambridge 2012, p. 2.

41 Cf. L. Manovich, *The Language of New Media*, The MIT Press, Cambridge-London 2002, pp. 69 ff.

42 *Ibid.*, p. 27, italic mine.

without losing their independence»[43]. New media allows the *automation* of many manipulation operations or even content creation[44]. New media objects are not objects that remain immutable indefinitely, but can be modified from a common matrix; this *variability* consists therefore in the fact that «[i]nstead of identical copies a new media object typically gives rise to many different versions. And rather being created completely by a human author, these versions are often in part automatically assembled by a computer»[45]. By *transcoding*, finally, Manovich, similarly to Kittler, means the fact that any previous medium can be encoded and simulated inside the computer; This, according to the author, involves the fact that the "computer layer" («computer's ontology, epistemology and pragmatics»[46]) inevitably conditions the "cultural layer"[47].

As far as transcoding is concerned, Manovich is interested above all in its cultural consequences and he does not believe that it represents the specific ontological difference between old and new media: this point, therefore, escapes the objection addressed to Kittler because, for Manovich, *transcoding is a consequence*, and not a cause, of the novelty of the new media. Modularity, then, is certainly an important feature of current digital technologies, but it is not only typical of them. Regarding automation and variability, by admission of the author himself, they are direct *consequences of the first two principles* (numerical representation and modularity). On closer inspection, then, what Manovich considers decisive to distinguish the new media from the old is numerical representation.

After all, it seems clear that for Manovich the real novelty, the real epistemological breakthrough lies in the advent of the software[48]: «new media are essentially software applications»[49]. The author, in dismantling some "myths" about digital media, points out that the only true meaning of the word "digital" that represents a radical rupture between old and new media is numerical representation[50], namely, what «turns media into computer data thus making it[51] programmable. And this indeed radically changes the nature of media»[52].

In order for software to be really considered the turning point and radical break between old media and new media, it needs to be a typical element really *only* of new media, or the type of software of new media to be *absolutely different* from any previous software.

As far as the first hypothesis is concerned, it can be discarded, since software

43 *Ibid.*, p. 30.
44 Cf. *ibid.*, pp. 32 ff.
45 *Ibid.*, p. 36.
46 *Ibid.*, p. 46.
47 Cf. *ibid.*, pp. 45 ff.
48 It is no coincidence that, about ten years after the release of *The Language of New Media*, Manovich has produced an essay with the significant title *Software Takes Command*: cf. Id., *Software Takes Command*, Bloomsbury, New York-London 2013.
49 A.R. Galloway, *The Interface Effect*, cit., p. 3.
50 In fact, what we call "digital" today, referring to computers and devices derived from it, is *discrete*, *electronic*, *mathematical*, *binary* and *algorithmic*, where at least "mathematical" and "binary" can be summarized in "numerical". It is no coincidence that, in French, when referring to digital, the term *numérique* is used.
51 Manovich uses the term "media" treating it as a singular.
52 Cf. L. Manovich, *The Language of New Media*, cit., p. 52.

simply means the non-mechanical part of all techno-logical objects, i.e. the intrinsic instructions that regulate its operation; or even the component added from outside to a technical object to ensure that it is used for a certain purpose, i.e. operating instructions. After all, the term software was used for the first time in reference to the keys contained in the cipher-calendar of Enigma, the cryptographic system used by the Nazi armed forces: it was composed of an electromechanical component based on three (subsequently four) rotors and variable instructions depending on the day regarding the rotor set-up; these instructions, in order to be easily destroyed, were written on soluble paper and, for this reason, the Royal Army technicians who were asked to decipher the code called this component "soft-ware".[53].

However, one can still think that the type of new media software is something radically different. Here too it is necessary to understand in what sense: if it is meant, in fact, that there is *one* software that makes new media different from the old ones, then one will remain still far from reality, even considering the fact that there are different types of software supported even by the same digital medium; if, on the other hand, it is meant that there is a technical and material component that is condition of possibility of any software and programmability in current digital devices, then one *could* be on the right track.

This is because the possibility of data processing a software and therefore of making it storable and programmable by a machine is due to a technical element present in the material *a priori* of digital media: the vacuum tube. What should therefore be asked in order to test the epistemological validity of the distinction between old and new media is whether the introduction of the vacuum tube in the media apparatus has produced such an epochal rupture that it *necessarily* and *only* gave birth to our "new" media.

The vacuum tube made possible the architecture of first generation computers, i.e. the first digital devices in the contemporary sense of the term. The vacuum tube computers, in fact, were computers that used vacuum tubes for logic circuitry. Those computers exploited cross-coupled vacuum tube amplifiers to produce a train of pulses constituting the basis of the *flip-flop*, i.e. the fundamental element of every electronic binary digital computers. These vacuum tube networks were thus able to store data in the form of electrical signals – making them discrete and mathematically formalizable – and even instructions for processing them. These instructions were, in fact, the first forms of programs and therefore software.

The role of the vacuum tube in the birth of the contemporary digital computer does not end here: the first real Random Access Memory (RAM), as it will be seen in the chapter on aesthetics, was a particular type of vacuum tube called Williams Tube, which is actually a cathode ray tube.

Although first generation computers have been largely supplanted by second generation transistor computers and although today's ROM and RAM memory systems largely dispense with them, it can still be said that vacuum tubes were the

53 A PDF version of a copy of the 1940 Enigma user manual is available at https://www.ilord.com/enigma-manuals (accessed 20 March 2020). For an idea of its fundamental mathematics (and therefore, in a sense, of its software), see A.R. Miller, *The Cryptographic Mathematics of the Enigma*, Center for Crypological History, National Security Agency, 2001.

technical condition of possibility for the birth of the first "new media". Yet vacuum tubes have had and have other functions too[54] and, above all, have also contributed to the birth of analog media: audio vacuum tubes have been fundamental in the birth of radio[55] and the cathode ray tube (Williams Tube and its variants) was already used for monitors and televisions.

If the alleged break between old and new media is to be placed at the separation between analog and digital (which still represents a fundamental break between different ways of manipulating physical signals) and, in particular, between a hardware considered (wrongly, as will be seen) still analog and a digital software[56], then it will be found that it is virtually impossible to precisely locate this break from a technical point of view.

Later in the text the different positions between continuists and theorists of the break between analog and digital will be analyzed. In that chapter arguments in favour of the discontinuistic position will be proposed, but the difference with those who see that breakthrough as a separation between "old" and "new" lies in the fact that here is not intended to understand the analog/digital dichotomy as unique: it is only one of the breaks in media history. Each medium must be conceived as a combination or recombination of the technical a priori and, rather than talking about temporal phases as if they were geological eras, one must speak of lines of rupture and lines of continuity, of different or similar modes of media interaction with other media, with the environment, with human beings; of partitions or similarities between analog and digital, between live, real time, or deferred communications, between acoustic and visual, etc..

Summing up, it can be said that the chronological justification for the use of the expression "new media" could be accepted, but one should also accept the fact that this expression is a moving label, under which new objects will fall from time to time; on the other hand, the epistemological justification would seem more like to authorize to recognize and thematize specific differences between different eras, but also different types of media and to call "new" those that, from time to time, represent a strong break with previous or contemporary technologies.

In both cases, however, it would be advisable not to flatten the history of media on a linear and progressive format: it should rather be considered as a series of variations on a theme. This theme is none other than the definition of medium as techno-logical, *operational object* aimed at mediation, characterized as a *milieu* of diffusion.

54 Simondon compared vacuum tubes to organs in a living body. They are technical elements, more than complete individuals: they carry out their function by integrating it with that of more complex individuals and systems, integrating and cooperating for the purpose of the latter. They have in fact been used to foster self-regulating phenomena (cf. G. Simondon, *Du mode d'existence des objets techniques*, cit., p. 80).

55 Even the radio, by the way, in its later development, became a *transistor* radio. This allowed for smaller size and greater portability.

56 For a summary definition of the current concept of "digital" that dismantles also the false myths about its immateriality, may I be allowed to refer to my *Towards "Post-Digital". A Media Theory to Re-Think the Digital Revolution*, in «Ethics in Progress», Vol. 10 (2019), No. 1, pp. 83-93: 84-89.

1.6. Iridescence.

Media are, as seen, operational: they can store, process, or transmit information. There is one such operation, however, which necessarily involves other elements of a system: it is transmission. With it, a medium mediatizes previously stored data, transforms them into information and then sends them to another medium or reveals them, translating them into an action directed towards the environment or into a phenomenological representation perceivable by a user, such as a human being.

This last case, especially where the representation appears particularly "immediate" and "transparent", seems to correspond to that mode of mediation that Galloway puts under the sign of *Iris*, the Greek goddess of rainbow, messenger of the Olympic gods as Hermes; but unlike him, she is the neutral bearer of messages which are not hers, direct transmitter and never deceiver.

The characteristics of this particular mode of mediation that can be defined "iridescent" are, according to Galloway, first and foremost the *unidirectionality* and the *non-need for feedback*[57]: what is transmitted by Iris simply shows itself and does not seem to require the contribution of the user to construct its meaning. Iris' mediation *does not presuppose an absence*, a distance to be bridged by communication, but rather immediate presence and contact: it immediately affects the senses, primarily sight, with an essentially physiological impact, in the belief that «[t]o tell is to touch»[58].

The main characteristics of iridescence are (i) the *nearness*, or more precisely the fact that «[t]he immanent communion of two things produces a mediative relation of nearness in which both parties remain within themselves such as they are»[59]; (ii) the *surplus of expression*, the presence of (apparently) unmotivated aesthetic outputs[60], that carry with them the phenomenon of *redundancy*; (iii) *certainty* understood as a possibility of *mathematization*, since the immediate sensory phenomenon can be analytically fragmented and translated into formal language, just as light, through refraction, can be fragmented and the colours of the spectrum, i.e. the rainbow of which Iris is the goddess, can be identified[61]. With regard to this last characteristic, however, it must be said that analytical mathematization, although part of the possibilities inherent in iridescence, is not the first way in which it is perceived in its immediacy: «Iris – in fact – is "objectively" a matheme, but "subjectively" a patheme (i.e., an expression of pathos, a poem)»[62].

Precisely on the basis of this description derived from Galloway, however, the impression obtained is that, more than an actual mode of mediation – which, as we will see below, always defines a process – iridescence is the *phenomenological appearance* conveyed by the medium: it actually returns a message without revealing the whole process through which it was actually constructed and transmitted. In some cases this impression of iridescence can be founded: unidirectionality and

57 Cf. A.R. Galloway, *Love of the Middle*, cit., p. 42.
58 *Ibid.*, cit., p. 43.
59 *Ibid.*, cit., p. 44.
60 Cf. *ibid*.
61 Cf. *ibid.*, p. 45.
62 *Ibid.*, p. 46.

fidelity (in the sense of indistinction between message and noise) are indeed characteristics of *analog media*.[63]. In other cases, like those of the digital media, the impression of immediacy – which will be investigated further on – is, precisely, only apparent, favored by various factors, among which the extreme rapidity of the communication and the facility of access.

The iridescence of the media concerns what appears and therefore also what affects the senses and the perceptive effect that the media have on human beings. In the case of visual interfaces, for example, iridescence is an optical phenomenon that manifests itself in apparent immediacy, but instead *hides a mediation process*.

In addition, media also participate in the mediation process and influence the phenomenological appearance. As techno-logical objects, in fact, they shape the information that flows through them both according to the characteristics of their shaped materiality and according to their own logical schemes. For this reason also the phenomenological appearance of information will be regulated according to these conditions.

Rather than talking about Iris as a mode of mediation, therefore, it would be more appropriate to make iridescence an object of phenomenological study of the media in relation to perception, also addressing the links between perception and the *process* that produces it, which is the only one that should be properly defined as "mediation". Media, perhaps in particular digital media by virtue of their ease of use, tend to appear on the surface under the sign of Iris in order to hide the complexity of mediation[64].

Iridescence (which is therefore a *partial* view of the function of the media) is only an appearance that hides the complexity of the mediation process. Not only that: as will be seen, what appears on media interfaces also has an operational function and requires or arouses feedback from users.

In other words, in considering Iris as a mode of mediation, we lose something of the process behind the superficial appearance of the media and their interfaces; we mistake for mediation something that is, in fact, only one side of the mediation process; we mistake something for mediation that is not and, indeed, hides it. This all relates to the discourse on the *ideology of transparency* that will be dealt with later in this work.

Iridescent, in essence, can be media and, in particular, their interfaces. But the mediation process, which they too help to carry out, is anything but direct, near, or certain. The supposed transparent goddess Iris might just be the facade, she might

63 Even in this case, however, the nearness remains apparent, since what is recorded and reproduced (even if it is a live reproduction) is in any case absent at the time of reproduction; because fidelity is such precisely because recorded reality is not passed through mathematization; because, even if it records without mathematically coding, a technical apparatus filters reality according to its own characteristics, its own potentialities, its own limits; because, finally, although there is a certain unidirectionality of the message, precisely because the medium does not distinguish between information and noise, it is up to the user to do so, if not by giving feedback, at least by prolonging the mediation process.

64 To the cultural and philosophical model "inverted pyramid" in which the vastness of complexity hides a simple essence that can only be reached with intellectual and interpretative effort, a well-designed media system – and the digital one in particular – opposes an "upturned pyramid" that presents the simplicity at sight and the complexity hidden at the base (cf. A. Baricco, *The Game*, Einaudi, Torino 2018, p. 152).

be none other than Hermes – who, after all, remains the deceiving god – in disguise.

2. Mediation.

In the definition of media that was given in the previous section, a term appears that would in turn need definition: *mediation*.

If there was no lack of confusion with the term "media", with the term "mediation" it is no less. Indeed, in the common language "mediation" is a polysemic term: it can mean *communication*, *compromise*, *instrumentality*, *aid*, *translation*. If the meshes of the definition I gave of "media" were very narrow, those of the definition of mediation will be wide enough to include, in fact, all the meanings mentioned above. By mediation, in fact, I mean a *process* in which data are *collected*, *processed*, *transmitted* or *received*, thus becoming *information*, i.e. *taking form*, *structuring*.

2.1. Media and mediation.

Before going any further into the proposed definition, it will be appropriate to start by distinguishing «two grand domains which are [...] so much different from one another strictly by virtue of being so intimately conjoined»[65].

John Gullory, through careful philological analysis, has made manifest the fact that in the history of theoretical reflection, «the substantive noun *medium* was rarely connected with matters of communication before the later nineteenth century»[66]. Although throughout the twentieth century, however, the media has been considered as instruments of communication, the two terms – media and mediation – have rarely been properly connected: part of the theory (*communication studies*) focused on mediation as communication and turned everything that somehow guaranteed it into a medium[67]; the other side has reduced the media to ὑπομνήματα, where τέχνη «is substrate and only substrate»[68].

The position that the media, as technical objects, are nothing more than hypomneta, an *externalization* of something human, is certainly that of McLuhan, but, after all, also that of Kittler. According to Kittler, the medium is not so much an extension of the human, but a form of externalization, a prolongation thanks to which the human being can insert himself (and perhaps dissolve) into mediation.

65 A.R. Galloway, *The Interface Effect*, cit., p. 13.

66 J. Gullory, *Genesis of the Media Concept*, in «Critical Inqury», 36 (Winter 2010), pp. 321-362: 321.

67 In this strand are inserted all those studies that consider *infrastructures as media*, in the logic that confuses the channel with the medium and that has been criticized in the previous section. From this point of view, *mediation* and (information) *transport* become synonymous and so a part of the process (transit) is confused with its totality. According to this conception, «[t]ransportation yields an almost perfect image for the account of psychic and social effect of media» (J. Mangold, *Traffic of Metaphor: Transport and Media at the Beginning of Media Theory*, in M. Näser-Lather, C. Neubert (eds.), *Traffic. Media as Infrastructures and Cultural Practices*, Brill, Leiden-Boston 2015, pp. 73-91: 83). The initiator of this "infrastructural" mediation and media theory is perhaps Harold Innis – who, from studies of infrastructure and commerce in the '20s and '30s (cf. H.A. Innis, *A History of the Canadian Pacific Railway*, HardPress, Lenox 2012) has come to communication theory in the '50s (cf. Id., *Empire and Communication*, Dundurn Press, Toronto 2007) –, who, however, «never present means of communication as interchangeable with means of transportation» (J. Mangold, *Traffic of Metaphor*, cit., p. 83 footnote).

68 A.R. Galloway, *The Interface Effect*, cit., p. 16.

However, attention must be paid to the definition of the role of the medium with respect to mediation: if the medium were only a substrate on which mediation flows and streams, then two orders of problems would arise.

The first would be the usual problem of the middleman, with its risk of *regressus ad infinitum*: media are the substrate of mediation, but then what does open to mediation namely to its transit through the media? And how does mediation, through the media, connect a source and a receiver? What causes communication between a source and a medium? And between a medium and the receiver? The problem of the middleman does not arise only if, as will be seen, mediation is understood as a process of which the media are only part of the actors and which can take place, albeit in a different way, even in their absence: for there to be mediation, a middleman is not always necessary.

The second problematic plexus opens precisely if we assume this last procedural consideration of mediation, but we conjugate it with the affirmation that the media would only be its material layer. In this case, if mediation is a set of relationships potentially involving everything and, in any case, vast sets of objects, environments, and individuals, then everything (sources, channels, products) could be considered a medium, as a material substrate. But if each object could be considered indiscriminately medium, if there were no distinction between media objects and objects that are not media, then neither would the mediation process, which has precisely the function of connecting different orders, make sense. Media interact at the junctures where it is necessary that the language of one order is translated in favor of another, or where it is necessary that an ongoing mediation is enhanced, prolonged, modulated.

Paraphrasing – and perhaps partly betraying – Debray, one can identify how media are getting into the mediation process. The medium follows in its action *two trajectories*, or *vectors*: one *technical-material* and one that the French author defines as "institutional" and that I'd rather call "*of mediation*"; the first corresponds to *organized matter* (OM), while the other is a *material organization* (MO). The physical medium (OM), for example, corresponds to a code (MO); the mode of externalization (visual, acoustic, etc.) (OM) corresponds to an organizational framework (the prediction of the environment associated with the medium) (MO); the circulation devices (channels or media themselves understood as modulators) (OM) correspond to the forming matrices (the way in which the medium acts on the environment or on other actors of a system) (MO)[69].

Media are objects that participate in the mediation process by virtue of their intrinsic purpose and do so mainly through their interfaces. They play a particular role in this process and this role can only be understood in the light of the concept of information, which will be discussed shortly.

2.2. Transmission and communication.

If the media participate in the mediation process, then they do so through one of their main functions, which were said to be storing, processing, or transmitting information. Analyzing the meaning of these terms and trying to connect it to the concept of mediation understood as transformation and communication of different

69 Cf. R. Debray, *Introduction à la médiologie*, cit., p. 127.

orders, then one could think that the first two have a fundamentally passive function: a medium that stores data is a terminal that acts as the end point of the process and stores the data in view of a new activation, like a vinyl record that stores the material writing of sound waves waiting for another medium (a gramophone) to "reactivate" it and thus transform the stored data into acoustic information; a medium that processes generates a flow of information, but does so internally, without exchanging data with the outside world and, at most, sending or showing the resulting data only at the end of processing, as does a printer that transforms electronic inputs into text strings or images, or a human being who, by following simple instructions, manipulates data to reach conclusions.

The most active function would seem to be that of transmission, since, by generating movement, it seems to generate information and, by connecting different devices or components, it seems to generate communication. This is precisely why, sometimes, the concepts of transmission, communication, and mediation are superimposed, when it would be important to separate them.

Debray clearly distinguishes between transmission and communication, linking them to two different time regimes, and considers only the former an object of mediology. For my part, I will criticize the distinction made by Debray, but not the distinction itself and I will point out that, in any case, both phenomena are part of the broader mediation process.

According to Debray, communication has to do with a *synchronic* temporal regime: it is the transmission of instantaneous information, not necessarily significant in the long term, that serves to bring instructions or useful data for the immediate present. On the contrary, transmission has to do with *diachrony*: it is the transmission of individual or collective meanings, but above all of *memory*[70].

According to the French mediologist, «communicating consists of *transporting information through space*», while transmitting consists of «*transporting information through time*»[71]. Transmission, therefore, is that process that uses *material supports* to convey *historical horizons* through *technical performances*, thus contributing to create relationships based on a historical and *collective memory* that will become the basis of society. Debray puts the idea of transmission in relation to the concepts of *continuity* and *culture*[72].

This definition of transmission is already very close to the definition of mediation proposed here, but it has some limitations. First of all Debray limits the transmission to *deferred transmission*, restricting live or real time to a matter of communication. Although he uses a term borrowed from technical language, he considers the operation of "transmitting" as if it were only that of "handing down"[73]. In this way a transmission becomes definable only *a posteriori*: once it is certain that such a meaning has been deposited in the collective memory, only then

70 Cf. *ibid.*, cit., p. 3.

71 *Ibid.*, cit., p. 3, my translation.

72 Cf. *ibid.*, p. 3.

73 Debray uses the more "cultural" meaning of the French verb *transmettre*, which, like English *to transmit*, includes in its semantic range both the technical concept of "to send an information or a signal" and that of "to convey by inheritance or heredity". In Italian, on the contrary, such concepts can be expressed with two different, albeit similar, words: *trasmettere* (to send) and *tramandare* (to hand down).

will it be possible to say that it has been transmitted. This vision of the structuring of the individual and collective field of experience that is society, moreover, does not seem to take into account the gradual nature of the process and the fact that many acts of communication, beginnings of other transmissions, and much more must be included in such a long-term act of transmission.

Secondly, it has to be said that such a continuist vision does not even pay justice to the actual mechanisms of diachronic transmission. The transmission of a historical and collective memory, in fact, is also based on *fractures*, *discontinuity*, but above all on *selection*: one cannot speak of memory without speaking of *oblivion*, since memory, both individual and collective, both human and technical, *selects the data* to be stored and, as a result, discards those not selected[74].

Just as Debray seems to consider transmission only in its deferred form, so does he seem to consider communication necessarily as a *live* phenomenon. But what would he say about a private correspondence? The exchange of letters, even if it does not always convey a significant memory transmission for a society (and being therefore, in the sense of Debray, communication), necessarily takes place along a rather long time axis.

Finally, there are two aspects of Debray's definitions that make them difficult to accept. The first is that, although he had previously said that transmission helps to structure the collective, he then states that, while communication only requires a technical device (MO), transmission also requires an institutional framework (OM)[75]. But if the institution is necessary for the transmission, then it must pre-exist the transmission. So what does structure it? The second aspect concerns the fact that transmission would need a symbolic framework to transcend the generations, whereas communication could avoid it[76]. But how could communication be effective without a commonly accepted symbolic framework? How, for example, could instructions containing the address for a delivery be communicatively effective without the institutional framework that guarantees the meaning of street names, house numbers and coordinates?

For this reason I find it much more useful to redefine the concepts of

74 On the theme of the relationship between memory and oblivion literature, especially psychological literature, would be vast. However, for an exhaustive overview that keeps together psychological and sociological levels and moves with extraordinary fluidity between the fields of philosophy, literature, history, and cultural studies, see A. Assmann, *Erinnerungsräume. Formen und Wandlungen des kulturellen Gedächtnisses*, Beck, München 1999. The German scholar points out the link with oblivion already in the individual memory «[s]ince current affections and motivations are the watchers of remembrance and oblivion [*die Wächter über Erinnern und Vergessen]*. They determine what memories to make available to the individual at the right time» (*ibid.*, p. 64, my translation). Similarly, historical memory is made up of legacies and witnesses, i.e. selections more or less aware of meanings to be transmitted, which find their counterpart in events, situations, characters, and objects laid down in oblivion. (cf. *ibid.*, p. 75). Assmann analyzes in depth the link between history, understood as official, presumably objective memory, and collective memories, to be understood necessarily in the plural: collective memory is a living memory, whereas historical memory is instead an archive-memory (*Speichergedächtnis*), which, as an archive, is necessarily a selection (cf. *ibid.*, pp. 130 ff), selection which involves «the irremediable fall into oblivion [*das unwiederbringliche Verlorengehen*] of knowledge and life experiences that were once important» (*ibid.*, p. 134, my translation).

75 Cf. R. Debray, *Introduction à la médiologie*, cit., p. 15.

76 *Ibid*.

transmission and communication from the beginning, so that they can be re-framed within the mediation discourse.

The most trivial, but for this reason the most general, technical, and neutral definition of *transmission* is that of an act through which something is transmitted, where by *transmitting* we mean "to send or convey from one place to another" or "to send out" something as a signal or a message. From the point of view of a mediation theory, transmission means the *transfer of data* from one device to another or, more generally, from a source to a receiver through a channel; this transfer of data produces *information*.

With regard, instead, to the term *communication*, it is to be considered reductive the meaning of a simple passage of a message or a certain amount of information from one individual to another (which, as mentioned above, would correspond instead to a transmission operation). Communication, on the other hand, should be understood as the sharing of elements, meanings, information between different orders. Communication is facilitated by transmission, which enables the transfer of information between two systems; however, the data transported must also be made compatible with the receiving system, must be transformed, and these are all parts of the mediation process.

It can therefore be concluded that, while transmission is an integral part of the mediation process, communication is one of its possible outcomes and, therefore, is one of the intuitive meanings that are usually associated with the word *mediation*. Communication as a result is both "instantaneous" communication in Debray's sense and the opening of an interchange relationship between systems that prolongs mediation through the exchange of meaningful messages. Other outcomes of the mediation process can be *compromise* (similar to communication, but more stable, more crystallized in a not exactly dynamic balance), *instrumentality* (in which one of the two systems makes its own tools available to another so that the other exploits them), *aid* (in which one system acts on another to regulate it), *translation* (in which two systems cooperate to make each other understandable).

2.3. Information and individuation.

It has been said just above that transmission, as part of the mediation process, consists of transporting information. It will therefore be necessary to clarify what is meant by information and how it relates to mediation processes.

The term "information" should be understood in the general sense given to it by the first elaborations of cybernetics and developed by Simondon as a fundamental element of his theory of *individuation*. Simondon considers information mainly as a taking of form, a structuring process, the search for a balance which, however, is not the stable balance (that of good form), but the *metastable* one (which allows the information to persist and be prolonged)[77]. According to the French philosopher, this process, which consists mainly of a passage from the potential energy of a system to its actualization by structuring matter, is the one that regulates all physical, biological, psychic, social, and technological transformation[78].

77 Cf. G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., p. 26.

78 With regard to the role of information in physical individuation see *ibid.*, pp. 123 ff; for vital individuation pp. 190 ff; for the psychic one pp 233 ff; for collective or trans-individual pp 296 ff.

Information is also signification and is always the result of a confrontation: it «is never a single term, but the meaning that emerges from a discrepancy»[79].

In defining mediation, it was mentioned that, through it, data is transformed into information. Through the Simondonian notion of information, focused on dynamism and metastability, it is possible to better understand this passage. Data is to be understood as something "given", available, relatively inert: matter or potential energy, crystallized information packets, left in potency. They are present and real, but they are "virtual" as they are not yet actualized in their potential. The information is instead to be understood as a *dynamization of the data*.

Although this relationship will be better explained in the next section, we can already parallel the concept of mediation proposed here with the notion of individuation proposed by Simondon: data are to be understood as the potential energy that, in Simondon's ontogenetic theory, is actualized, thus going to structure a matter (even the physical signals of an electronic medium are to be considered "matter"), which is organized into individual structures (digital objects are also individual structures[80]). This process, this *ontogenesis*, is a taking of form, or, indeed, in-formation.

Information is the way *individuation* moves and shapes reality. By individuation Simondon means the formation of individuals from an indistinct preindividual by means of transductive jumps, resolution of tensions, structuralizations and restructurations, in the direction of the above mentioned metastable balances. The individuation consists in the communication between two orders to find an impossible stabilization in the starting system: the potential energy (higher order) is actualized, a matter (lower order) is organized and divided into individuals (middle order).

2.4. Individuation and mediation.

Even if it has been said that mediation is that process that transforms data into information, even if it has been said that information is the way of propagation of individuation, and even if it has just been established that individuation is research, discovery, and production of a *middle order*, one should not be tempted to superimpose perfectly individuation and mediation.

Individuation is an ontological process and concerns the generation of individuals; *mediation is a particular type of individuation* that presupposes already formed individuals, endowed with their associated environments and codified in a certain

As far as the evolution of technical objects is concerned, see Id., *Du mode d'existence des objets techniques*, cit.

79 Id., *L'individuation à la lumière des notions de forme et d'information*, cit., p. 35.

80 When referring to digital contents we might have doubts in defining them as "objects", because, according to a common prejudice, we would consider them part of a "virtual" environment. But today, «[t]o understand the "real", we must compare it with what is commonly understand as virtual» (Y. Hui, *On the Existence of Digital Objects*, University of Minnesota Press, Minneapolis-London 2016, p. 47). We are surrounded by digital objects with their own (digital) individual structure: they are «new forms of industrial objects» (*ibid*., p. 49). By digital objects we mean both the mapping and subsequent digitization of physical objects, and the creation of new objects from collected and processed data: it is a double movement of *datification of objects* and *objectification of data* (cf. *ibid*., p. 50).

way. Mediation connects, creates new compatibility, and restructures individuals.

In mediation, data are physical entities (e.g. signals, impulses, material organizations) susceptible to a symbolization (e.g. in digital mediation) or to a recorded and re-presented transposition into organized portions of matter (e.g. in analog mediation), and which can become operational instructions. This means that these data, so processed (symbolized or transposed), translated and then transmitted as information, can modify a system, thus generating an individuation; they can become the basic instructions through which a system works or propagates.

Mediation, therefore, *is the type of individuation in which information derives from the passage and mobilization of this type of data* and in which it is *conveyed by* objects capable of operating on this type of data: *the media*.

Mediation has two possible outcomes, which also correspond to two major media groups. The first outcome is *mediation as a rapprochement*, as the solution of the disparity between two systems close to contradiction that find a stable order of compatibility, resolve a conflict. In this case mediation results in *its own annulment*: the process is successful and therefore ends. An example could be the conclusion of a peace treaty between two powers previously at war. The media that support this type of mediation are usually *media in the improper sense*, i.e., objects that serve as media, which are used as media in order to achieve a certain result, only to return to being non-media objects, somewhat like a flashlight that, after being used in a transmission of a message in Morse code, begins to be used again for the purpose of shed light in the dark.

The other outcome of mediation, on the other hand, is to establish long-lasting communication between two systems. In this case the information is not transmitted once and for all, but rather a channel is opened that allows the *perpetuation* of an exchange of information. The two (or more) systems connected by this type of mediation continue to inform each other in a bi-directional (or multi-directional) exchange. If in the first case the success of the mediation depended on its own self-annihilation, in this second case the mediation must be self-perpetuating. The media that support such mediation will therefore be the *media in the proper sense*, those that are able to modulate and manipulate information, those that aim to maintain or generate metastability, as does, for example, a thermostat that regulates the switching on of radiators according to ambient temperature, or social media that capture attention and ensure communication. This type of mediation connects, but keeps the gaps[81], so allowing reiteration and/or recursion.

Any type of mediation, however, has a procedural nature, involves steps, translations, modulations, different outcomes depending on the medium that instantiates it. The presumed objectivity of the data is always manipulated by mediation. It is no coincidence, in fact, that the god of mediation *par excellence* is

81 To return to the figures of mediation in Aristotle, we could say that this type of mediation partly corresponds to syllogism: it «is used to link together (*sun-legein*) what is distinct, to establish a link between what is separate; it links two terms by means of a third» (E. Alloa, *Metaxu. Figures de la médialité chez Aristote*, cit., p. 250, my translation). The syllogism, in fact, provides a formal structure that remains operative even as the premises change and that makes use of a middle term (μέσον), which, as we have already seen, is the Aristotelian figure that comes closest to the concept of medium proposed here.

Hermes, a messenger yes, but also a great deceiver.

2.5. Hermeneutics.

Hermes, according to Galloway, is that mode of mediation that transmits, but conceals at the same time, that transforms, interprets, deceives; if Iris is presence, Hermes is absence; if Iris is externalization, Hermes is communication. He represents «mediation as extension, transit, representation, reflection, mimicry, and alienation»[82].

In essence, the mode of mediation that Galloway identifies with Hermes is the only one that should be properly called mediation. If mediation is the process and therefore includes all stages of it, it cannot be confused with its outcome. Sometimes the outcome of mediation can be "hermetic" and requires other components of a system (including the human one) to act as media to prolong the process and provide further interpretations; other times it is "iridescent", it manifests itself on the surface of the receiving medium in a clear and (more or less apparently) unambiguous way. But the process that starts with data and arrives at information through transmission always requires a search for compatibility and a "translation" in the broadest sense.

Mediation is hermeneutic because it is continuous interpretation: it *interprets data* in the sense that it mediates them by making them information, transmitting them and making them compatible with the system of meanings of the receiving system; it *interprets feedback*, in the sense that it performs a function of *a posteriori* regulation of a starting system based on the response that the receiving system has given to the previously transmitted signal; it *interprets itself*[83] in its own dynamism tending towards self-preservation and perennial movement.

«In hermeneutic mediation there is never simply a direct relation to truth, there is always a *confrontation* with truth»[84]. This means that the apparent contradiction is admitted in mediation: mediation, as said, generates information from an apparent incompatibility and therefore it is not a peaceful process. Every mediation involves «a power struggle», because «*transmitting is organizing* and

82 A.R. Galloway, *Love of the Middle*, cit., p. 28.

83 With regard to self-interpretation in mediation, it can be noted that in digital mediation it manifests itself at its highest level. Yuk Hui talks about a *computational hermeneutics* that is a real hermeneutics in computation, based on the concept of recursion, which allows algorithms to interpret themselves. «Today when we write a computer program, we can write a nonrecursive function, but we can basically reduce every operation and number to recursive functions» (Y. Hui, *On the Existence of Digital Objects*, cit., p. 240). A recursive function is a function defined by applying a finite number of times recursion starting from basic functions. An algorithm is called recursive when it can be expressed in terms of itself, i.e. when, applied to a set of data divided into sub-sets, it recalls itself generating a sequence that continues until an exit condition intervenes. In other words, if an algorithm is the solution of a problem in a finite number of steps, a recursive algorithm provides for the recursion of these same steps until a condition already foreseen and inscribed in the algorithm itself occurs: it contains instructions for its application, its operation and its outcome. Again with Hui's words: «what is in the past is always ahead, because each function is expecting something to come, something that will bring the procedure to a close» (*ibid.*). In essence, it is a hermeneutical circularity.

84 A.R. Galloway, *Love of the Middle*, cit., p. 36.

organizing is hierarchizing»[85]. Even when it is not a matter of hierarchies, as will be seen in the chapter on cybernetics, mediation still produces *partitioning*, i.e. assignment of parts, roles, tasks.

Hermes *explains*, *denaturalizes*, *complicates*[86]: hermeneutical mediation *explains* the contents of a system to another system, which regulates itself through a different "language", according to a different semantic asset; it *denaturalizes*, because, while translating and approaching, it emphasizes the remoteness, the foreignness of a system that, in order to be communicable to another, needs a bridge-process; it *complicates* because, despite the apparent iridescence, it hides a complex logic.

Certainly the classically understood hermeneutical model does not seem to lend itself to the analysis of mediation processes understood in such a general and impersonal sense: philosophical hermeneutics is normally understood always in reference to the subject[87], the mind, the "spirit" and precisely for this reason it has been criticized by post-structuralism and by detractors of the idea of an autonomous and unitary human subject[88]. Yet, as will be seen especially in the chapter on cybernetics, typically hermeneutical concepts such as *system*, *circularity*, and *finality* are part of the discourse on mediation and media, even without a necessary reference to a human component: it is not only the human being who interprets the mediation process, but it is this process itself that is interpretation and the media also instantiate it. To mediation, which in itself is already under the insignia of the god Hermes, should be applied an analysis that could be defined as non-human-centered hermeneutics.

The hermeneutical model, therefore, if understood in this way and if freed from anthropocentric prejudice, is always a privileged interpretative model with regard to mediation as a process. Even when, as in the case of digital technologies, we are dealing with an imperative language such as programming language, we must take into account that it must be made compatible with the material levels of the hardware, with graphic or sound elements, with the language and the perceptive and interpretative capabilities of the human user. In this sense a "hermeneutic" process of mediation takes place, since it is always a matter of searching for a "fusion of horizons" (*Horizontverschmelzung*)[89] within a new horizon of compatibility, in the direction of a medial condition.

3. Mediality.

This fusion of horizons is what could be called an optimal medial condition. With *mediality*, or medial condition, we define that *condition in which media, people, objects,*

85 R. Debray, *Introduction à la médiologie*, cit., p. 10, my translation.

86 Cf. A.R. Galloway, *Love of the Middle*, cit., p. 40.

87 The hermeneutics of origins, as *ars interpretandi*, concerns the analysis and interpretation of texts. His rise to general philosophical theory, which also deals with theorizing the conditions under which interpretation and, in general, human understanding is possible, is due in particular to Hans-Georg Gadamer (see H.-G. Gadamer, *Truth and Method*, tr. J. Weinsheimer and D.G. Marshall, Continuum, New York 1997).

88 Cf. F.A. Kittler (ed.), *Austreibung des Geistes aus den Geisteswissenschaften. Programme des Poststrukturalismus*, Schöningh, Padeborn-München-Wien-Zürich 1992.

89 Cf. H.-G. Gadamer, *Truth and Method*, cit., p. 302.

subjects, data, information, operations are found when the mediation process is in progress. With *optimal medial condition*s instead, one must intend a disposition of openness and metastability that allows mediation to happen until its outcome (annulment or perpetuation).

Mediality is a very general condition that manifests itself every time there is communication, compromise, instrumentalities, aid, translation, passage of information. But, sometimes, some elements involved in the mediation process may find themselves closed to mediation or induced to passivity[90].

A system in optimal medial condition is an *open system*, since it allows the transit of information between its components, exchanges information with the environment and with other systems, allows the access or exit of components without interrupting the mediation process. Non-optimal conditions can occur in closed or isolated systems, defining *closed* a system that, unlike the open one, while guaranteeing the passage of information, does not allow the structure of its components to change, unless it interrupts the mediation process, and *isolated* a system that guarantees information flow only within itself.

3.1. Risks of disindividuation.

A closed medial system could be that of linear communication, i.e. that communication model that involves a transmitter, a channel or otherwise a linear series of channels, and a receiver. In this case the system can exchange (through transmitter and receiver) information with the environment, but it cannot dispense with any of its components: if, for example, the channel or one of its segments in parallel fails, or even if it is simply disturbed by noise, the whole system is compromised. This should not happen in networked structures.

An isolated medial system, on the other hand, could be that of a storage boiler with self-regulating temperature: a sensor measures the internal temperature; if the temperature falls below a certain minimum value, the electronic card used for self-diagnostics – to which the sensor sends the temperature information – will activate an information process to turn on the cylinder, which will heat the water until the sensor detects that the temperature has risen to a certain maximum value; at that point the electronic card will give the cylinder the command to stop. This process can continue on a regular basis without the need for information or material elements from outside. However, it is sufficient that any of the medial components involved malfunction or fail for the system to stop working.

Although closed or isolated systems can work well and be, in other words, in medial condition, it will not be said that they are in *optimal* medial condition, as they are too susceptible to malfunction and unable to replace independently their own component with other peers. On the contrary, in systems such as a Fail-over Cluster[91] the operation of the machines is continuously monitored and, when one of

90 A medium that is not in medial condition can be what Simondon calls an *abstract technical object* (i.e. not able to regulate itself in its relationship with the environment and other objects), while a medium in medial condition is a *concrete technical object* (cf. G. Simondon, *Du mode d'existence des objets techniques*, cit., pp. 24 ff).

91 By "cluster" is meant a number of computers networked together in order to function as a single computing system. Fail-over Cluster is one of the most widespread cluster types.

the hosts stops working, another machine takes over.

The only systems that could authentically access an optimal media condition are open medial systems. They could. Because, as McLuhan said, «[f]ar from being normal, successful communication is a rarity»[92]. In fact, it is enough that some single components of a system exit from the medial condition to enter a state of passivity – that is, it becomes an abstract technical object, it becomes *dis*individual – for the system to close, or worse, to isolate itself.

For a system to remain open and tend to an optimal medial condition, it must maintain its metastable balance, and so must its components. Both a stabilization of the system and its disintegration would instead lead to *disindividuation*: its individual components would return to being mere technical elements[93] and the flow of information would be stopped.

These risks of disindividuation will be discussed in more detail later[94], but a definition should be given here: *disindividuation means a dissociation* of the individual from its own *milieu*. Since, following Simondon, the individual must always be understood as a side of a dyad formed by its coupling with an associated *milieu*, the alienated human individual, the abstract technical object, the broken medium are all *disindividualized, decoupled, disassociated former individuals*.

The condition of the disindividuated individual is basically a condition of *passivity*. Passivity, however, is not necessarily negative: even leaving aside the Agambenian notion of inoperosity[95], one can take as a banal example the material to be shaped in the production of tools (but also of media), which must be somehow inert and passive, even if plastic. But, under certain circumstances, precisely because of passivity or closure, problems could arise, from the trivial malfunction of a mechanical component that causes damage to the entire system in which it is inserted, to a legal process that becomes bogged down when a key witness refuses to give testimony.

This type of passivity, this dissociation from *milieu*, from interaction, from mediation understood as the resolution of conflicts close to contradiction, has several causes and some of these will be discussed in this work. But at the root of the whole matter is the fact, partly disregarded by Simondon, that «[t]here is no dynamic without the duality of forces that attempt to annul each other»[96] and that,

92 Quoted in J. Cage, *I-VI*, Wesleyan University Press, Hanover-London 1990, p. 431.

93 A technical individual has an associated *milieu*, is able to gain one, to include other elements in its own *milieu*; the elements, instead, do not have any associated *milieu* and acquire a function only if inserted in a technical individual (they can be compared to organs in a human body) (cf. G. Simondon, *Du mode d'existence des objets techniques*, cit., p. 80).

94 See *infra*, pp. 146 ff.

95 The concept of *inoperosity* in Giorgio Agamben's recent reflection (see G. Agamben, *Il Regno e la Gloria*, Neri Pozza, Vicenza 2007 and Id., *L'uso dei corpi. Homo sacer, IV, 2*, Neri Pozza, Vicenza 2014) alludes to the revelation that the configuration of every function of power refers constitutively to the possibility of its suspension, thus legitimizing a deactivation of the apparatuses that opens them to a possible new use. Such inoperosity, therefore, is not passivity or inactivity, but the possibility of an "inoperative *praxis*", which does not disindividualize, but rather allows to escape from the constraints of certain biopolitical paradigms and to discover that there are different paths of individuation. For a critical reflection on the concept of inoperosity see V. Bonacci, *Inoperosità in Giorgio Agamben*, in «Pólemos», V. 2-3 (2010), pp. 174-189.

96 B. Stiegler, *The Theater of Individuation: Phase-Shift and Resolution in Simondon and Heidegger*, tr. K.

therefore, the tendency to individuation or concretization always corresponds to an equal and opposite power, to the laws of entropy that fight the effort of metastable organization.

Here the question of *power*, the "political" question of media and mediation is at stake. From a Simondonian point of view, technical objects are vehicles of transindividuality, they implement and reverberate functional schemes that can favour degrees of individuation that exceed the psychic one. As said at the beginning of this section, mediation processes, as particular processes of individuation, allow access to the condition of mediality, which is a "political" condition as it connects in a system of relationships regulated by normative and power relations individuals, groups, environments that condition each other in a search for balance susceptible to frequent prevarication and therefore breakage.

Biopolitics and psychopolitics are incorporated and dissolved into *mediopolitics*[97]: the control of the medial condition of objects and individuals affects the very processes of individuation, postures and positioning, economies of attention and energy, access to cognitive resources. On this level the possibilities of disindividuation take place.

The medial condition is a fragile, unstable condition that seeks and requires a metastable balance in order to reach its optimal state. In addition to being exposed to the risk of control and intentional manipulation, it can be brought to a close by far more trivial facts, such as failures, system errors, inadequate awareness of mediation processes. The question of "media power" is not (only) to be found in the influence of mass media, nor in the effects of mediation as such[98], but in the question of *access to the medial condition*.

Mediology has to deal with these issues. Its space is, therefore, that of the analysis of the medial condition, a complex, intertwined, connected condition made up of systems, individuals, elements. A condition that fully informs our contemporaneity and that, in order to be disclosed to thought, requires the picklock of an *authentically philosophical mediology*.

3.2. Infuriation.

Complexity, multiplicity, and interweaving characterize mediality. Looking at it as a whole, instead of dwelling on its parts (the media, among others) or on the process that connects the parts (mediation), one can compare it to that mode of mediation that Galloway puts under the aegis of the Erinyes, or Furies.

He postulates a new model of analysis – in which to "dissolve" Hermes and Iris – which, for his part, would be better suited to the current degree of complexity of

Lebedeva, in «Parrhesia», n. 7 (2009), pp. 46-57: 51.

97 See *infra*, pp. 152 ff.

98 In itself, mediation is, in fact, individuation and possible vehicle of *trans-individuality* still understood in the Simondonian sense as a push to overcome individuality in the direction of the *collective*, which, however, does not stop at the *interindividual*, at the "raw social", but requires the pooling of the *pre-individual* held by each individual for whom psychic individuality is able to imagine, but not to implement, a structuring (cf. G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., pp. 285 ff). In this regard it is worth remembering how Simondon himself considered technical objects possible catalysts of transindividuality (cf. *ibid*., pp. 340-344).

mediation. Galloway affirms, in fact, that the new "divine" form of mediation is today that of the *distributed network*: «instead of a problem or a poem, today we must confront a *system*»[99] and this, according to the author, makes both hermeneutics and phenomenology inadequate. The Furies «signals the triumph of multiplicity, heterogeneity, parallelity, rhizomatics, horizontal topology, complexity, and non linear systems»[100]; they «are an *ecosystem*, a *swarm*[101], a cloud»[102].

According to Galloway, infuriation is in a way anti-mediatic, because the complication of the system reveals nothing, it connects everything, but, precisely because of this, it is as if it does not connect anything for real, as if it abandoned any idea of meaning by compartmentalizing the medial condition into a «microphysics of links and vectors»[103].

In the furious condition there is no possible aesthetics or hermeneutics: «we must turn to *politics*, that branch of philosophy that deals most directly with force and physical transformation»[104]. If Iris and Hermes still seem to be dealing with media or processes that closely affect the human being, the Furies seem to *excommunicate* it:

> the Furies interface directly with the paradox of excommunication, for they embody the nonhuman form most completely. Swarms and systems threaten the sanctity of the human more than animals or things or ghosts. They violently reduce mind to matter,

99 A.R. Galloway, *Love of the Middle*, cit., p. 56, italic mine.

100*Ibid.*, p. 57.

101The term "swarm" recalls the well-known essay by Byung-Chul Han, *In the Swarm. Digital Prospects*, tr. E. Butler, The MIT Press, Cambridge-London 2017. According to the Korean philosopher, digital communities cannot be defined as a *multitude*, in the sense that Michael Hardt and Antonio Negri attribute to the term "multitude" in *Empire*, Harvard University Press, Cambridge-London 2000. This is because, according to Han, the contemporary multitude cannot be «capable of communal action» (B.-C. Han, *In the Swarm*, cit., p. 12), as the other two authors intended. Nor can the swarm be like a *crowd*, «because no soul – no spirit – dwells within it. The soul gathers and unites. In contrast, the digital swarm comprises isolated individuals» (*ibid.*, p. 10). As can be guessed, however, Galloway's perspective differs significantly from Han's, because although he identifies some typical characteristics of the swarm, such as instability and volatility of connections, he also describes it as a *system*, albeit not linear, or even an *ecosystem*. Galloway, in short, also turns his attention to those laws of systemic interaction that, while often breaking free of hierarchies and always of linearity, regulate the relationships between the components of a medial system. I will dwell more on this concept of a non-linear system in chapter V. Han, however, is not wrong in identifying some characteristics of self-isolation and closure to the mediality of human users in digital communication. His thesis, however, is that digital technologies necessarily lead to this outcome, as they produce the *homo digitalis*, which is an «*anonymous somebody*» (*ibid.*, p. 11) and therefore isolated and without ties with others and therefore also deprived of the distance that is a source of *respect* (cf. *ibid.*, pp. 1-6) and of sense of responsibility (Han affirms this despite the fact that today digital communication is characterized by a hypertrophy of both individual and collective identity and despite the fact that the thesis of anonymity as a theoretical justification for computer-mediated violence has collapsed – cf. F. Striano, *Fenomenologia del cyber-stupro. Note ontologico-filosofiche sulla violenza informaticamente mediata*, in «Lessico di Etica Pubblica», 1 (2018), pp. 92-106: 96-97). In the present work, instead, will be proposed the thesis that such closures to the medial condition by the human components of the system find their source in the *ideologies* that spoil the history of *interface design*.

102A.R. Galloway, *Love of the Middle*, cit., p. 58, italic mine.

103*Ibid.*, p. 59.

104*Ibid.*, p. 60.

> disseminating consciousness and causality into a frenzy of discrete, autonomous agents, each with their own micro functions[105].

The systematic complexity of the infuriation described by Galloway seems to adhere more to what has been called mediality in this chapter, i.e. that condition in which all medial actors (media, human and non-human individuals, objects serving as media, environments, etc.) find themselves whenever mediation processes are taking place. It does not seem to be so much a different way of mediation as the medial condition *described in its contemporary characteristics*.

This does not mean, however, that today we can no longer use the categories of media and mediation to describe parts or processes *within* the medial condition. Nor, on the other hand, can one say that the furious condition is exclusive to the contemporary, since multiplicity and interconnections have always characterized medial systems, even when the dominant media or forms of mediation were few if not unique[106]. In the present era, in fact, the "quantity" of complexity and, therefore, the complexity of the medial condition may have changed, but the general definition of mediation as a process of discovery of new metastable orders remains valid.

The analysis of the complexity of *networks* and *systems* is indeed important for philosophy as mediology, and has a lot to do with the study of mediality: networks and connections are often what, by materially supporting mediation, keeps various components of the system, particularly human ones, in a condition of mediality – or sometimes contributes to close to it. It is no coincidence that Galloway points out *cybernetics*[107] as one of the fields that has contributed most to the domain of "furious media" and, as will be explained in a dedicated chapter, it is precisely cybernetics that provides the ideal tools to understand from a *systemic* and *ecological* point of view the medial condition and the problems connected to it.

The revision of cybernetics that will be proposed in this work[108] will not by chance be read in a *political* key, as Galloway wants, because, as mentioned above, the question of the medial condition is inseparable from that of power dynamics. Precisely a political philosophy revisited from a cybernetic point of view and, therefore, *deanthropologized*, will provide the necessary categories to build notions of agent and action that come to terms with what is not so much an *excommunication* of the human being as a levelling, a *repositioning* that makes it one among the other equally important components of the complex medial systems.

Treating mediality as a mode of mediation among others also leads Galloway to talk about "furious media", which would, in fact, be contemporary digital media. As has been tried to show, even these media have iridescent components and processes governed by hermeneutical logic. In their connection with each other, with the environment, with other components (including the human one), however, they enter the condition of mediality. Therefore, analyzing these components in

105 *Ibid.*, p. 63.

106 Even in the age of oral culture, the plurality of voices, actors, languages, environments, circulation infrastructures, producers and receivers of messages, made the medial condition sufficiently complex.

107 Cf. *ibid.*, cit., p. 62.

108 See *infra*, pp. 134-144.

parallel, together with the processes that bind them, integrating more than sacrificing the previous paradigms, seems more suitable for the "furious" condition.

The risk of Galloway's linear narrative, which would instead be avoided here, could be to build a sort of historical-evolutionary succession of different types of media and mediations, which would sacrifice some of the complexity.

3.3. Seduction.

Galloway, finally, tries to outline *a fourth kind* of mediation that would represent, according to him, the *pure mediation*[109], symbolized by Aphrodite. This would be the mediation of all mediations, that which embraces every mode of mediation.

Already from this description it seems evident that the aphrodisiac cannot be a mode of mediation among others. On the contrary, it is not a mode of mediation at all and it comes much closer to what I have called *optimal medial condition*: it does not encompass complexity, it does not represent multiplicity reduced to unity, but rather *the unity expressed in multiplicity*[110]. Aphrodite takes promiscuity from Hermes, immanence and immediacy from Iris and propagatory tessellation from the Erinyes[111].

Aphrodite is the governor of the middle. She is mediator in the sense of the Greek verb μέδω, which indicates «to take care of, protect, rule over, or guard»[112]. Precisely in this sense it could represent the realization of the optimal medial condition, of the cooperation between iridescent media, environment, individuals in the mediation processes; it represents the metastable balance in the furious system.

But as is well-known, Aphrodite is the goddess of desire, of sex, of ἔρως. Susan Sontag spoke not surprisingly of "erotics" to describe the transparency and luminousness of media[113]. Aphrodite's metaphor in the field of mediation could in fact allude to this: the aphrodisiac element seems to have something to do with the seductive power of the media, but it also represents effectively the erotic character of the desire for mediation and mediality. Erotic tension is tension at an optimal medial condition, it is desire that holds together components that could tend to separate.

This erotic dimension of the search for the optimal medial condition constitutes a *trait d'union* with philosophical research: ἔρως, understood as a desire born from lack, is considered by Plato[114] the first engine of philosophy, its protective δαίμων, since also the search for knowledge arises from the perception of its lack.

Under the aegis of Eros and Aphrodite, therefore, also this theoretical and practical research, which is philosophical mediology, is being carried out: it seeks to *thematize the characters of the media, of the mediation processes, of the medial condition* and at the same time tends to *the realization of an optimal medial condition*.

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109Cf. A.R. Galloway, *Love of the Middle*, cit., p. 64.
110Cf. *ibid.*, p. 66.
111Cf. *ibid.*, p. 68.
112*Ibid.*, p. 64.
113Cf. *ibid.*, p. 63.
114Cf. *Symp*. 204a; Plato, *Symposium*, tr. A. Nehamas, P. Woodruff, in Id., *Complete Works*, cit., pp. 457-505: 486-487.

Once the objects of philosophy understood as mediology and its field of action in mediality have been established, it will be necessary to test it, ascertain whether it is able to generate an ontological, aesthetic and ethical-political investigation that frames and encompasses the contemporary in the light of its peculiar medial situation.

First, however, two questions seem to hover pending, mainly as a consequence of the definition of mediality given above: (i) is there anything that doesn't fall under the medial condition? (ii) can there be an optimal medial condition?

As for the first question, one could invoke Laurelle's theory of mediation, according to which «[t]here can be no world that is not already a world of mediation»[115]. Everything that is real, from this perspective, is communicated and communicable and there can be nothing outside of mediation. Everything is, one might say, in medial condition.

Now, although it is probably true that everything that is perceived and conceptualized by human beings (but also by media) is in the form of mediation, not necessarily everything that *exists*, exists in the form of mediation. Faced with a radical de-anthropologization of thought it can no longer be said that everything that exists is mediation just because everything that exists *for the human being* is mediation. As was said in the section on mediation, not all individuations are mediations; and, if the medial condition is what happens when a mediation process is in progress, then there can be no medial condition without mediation.

More complex is the question on the *optimal* medial condition. It seems difficult to make, if not on a very small scale, concrete examples of systems in optimal medial condition. One of the challenges of the mediological enterprise will therefore be to establish the *conditions of possibility* of it. Not only: if, as has been said, philosophy understood as mediology must be both theoretical and practical at the same time, it is then possible that it is called upon to *construct* the optimal medial condition or, at least, to express normatively on it.

Mediology as a theory and practice of mediality, in other words, must provide a theory of how to access the medial condition, but also of the causes of its closure. To do so, it cannot disregard a media theory and a theory of mediation.

One of the spaces in which one can observe the opening of the medial condition, its conditioning and opening to new possibilities at the same time, but also the risks of closure, control, and constriction is the *interface*, understood as the *threshold* of interaction (and therefore medium) and space of structuring (i.e. mediation). For this reason the interface can be an ideal case study for a philosophy understood as mediology that wants to challenge itself.

115A.R. Galloway, *Love of the Middle*, cit., p. 52.

III. Techno/cultural: Defining the Interface

In order to understand mediality as a condition, it will be necessary to stand in the *lieus* of intersection, between media and mediation, between data and information. These are not simply channels, or doors, they are not only μεταξύ; they are places for perceptive, affective, symbolic, attentional exchange. These *lieus* are *interfaces*.

1. Privileged places.

In order to understand how interfaces are to be comprehended as places of mediality, I will begin to define them following two complementary interpretative lines: (i) interfaces are cultural techniques; (ii) interfaces are intersection points and places for convergence and communication.

(i) The interface as a cultural technique is what relates visible and invisible, audible and inaudible, touchable and untouchable, and that creates conditions and regimes of visibility, audibility, or tangibility: it cuts, selects, frames a portion of reality and makes it perceptible.

But, first of all, we must clarify the content of the expression "cultural technique", since it can include different meanings. Within the foundation of the so-called "German Media Theory", although the expression was not yet used, some key concepts were discussed that would be included nowadays in the definition of cultural technique, such as «media, symbolic operators, and drill practices» intended as analytical tools «at the base of intellectual and cultural shift»[1] in the field of Discourse Analysis[2].

Another way to understand cultural techniques is to refer to the set of those techniques and technologies that allow the production of cultural expressions. At this point it would be reasonable to ask what exactly we mean by "cultural expressions": art and literature? And how do we deal with oral culture? Entertainment? Admitting any expressive form to the list of cultural expressions would risk widening the field too much and frustrating the effectiveness of our definition. On the contrary, narrowing the range to some of them might seem arbitrary and the need to justify any restriction would lead us to a *regressus ad infinitum*.

It can be said, in a certain sense, that cultural techniques represent all these things (tools of analysis and production of culture), but it is necessary to give a more general definition that takes into account why they are "techniques" and why they are "cultural". I would define them first as *algorithmic* processes and/or devices, that is, *procedures* aimed at obtaining a result in a finite number of *steps* – sometimes they can be recursive[3] – (techniques) which produce organization of

1 B. Siegert, *Cultural Techniques. Grids, Filters, Doors, and Other Articulations of the Real*, tr. G. Winthrop-Young, Fordham University Press, New York 2015, p. 2.

2 Cf. F.A. Kittler, *Discourse Networks 1800/1900*, cit.

3 Cf. B. Siegert, *Cultural Techniques*, cit., p. 14.

matter and of our (perceptive, cognitive, performative) relations with it (culture). In this sense we can consider as cultural techniques writing, painting, counting, making music.

A fundamental thing to note, however, is that are also «*basal cultural techniques*» those that lead to the introduction of the key distinctions that accompany the emergence of a culture: «inside/outside, pure/impure, sacred/profane, female/male, human/animal, speech/absence of speech, signal/noise and so on»[4]. In this sense the interface is a fundamental cultural technique because it introduces the distinctions (visible/invisible, audible/inaudible, touchable/untouchable) that are preconditions for any form of writing, painting, language, etc.

The type of dominant interface used by a culture determines its way of representing reality and therefore also its system of knowledge and action. The centrality of the grid, of which Siegert[5] speaks, as a writing of the absence and as an algorithmic translation procedure, linked by a double thread to the expansion (geographic and not only) of Western culture starting from the XVI century, is a good example of that.

In general we can say that the interface represents a double movement of externalization and internalization: it represents the way of a certain culture to see (and not see) the world, but it then determines the successive conditions of visibility (and invisibility). This double movement must be understood in a cyclical and systematic sense: it is not possible to rigorously establish the chronological priority of one of the two moments over the other. Obviously, in order for a certain way of seeing to be externalized, it must first be imagined, or at least perceived; however, the possibilities of externalization are limited and conditioned by the available techniques and material substrates. At the same time, an externalization device conditions our way of perceiving, but it is also subject to possible modifications by our creativity, which may decide to privilege certain aspects of it rather than others, or may attempt to go beyond the device itself, trying, from time to time, to include or exclude what is outside or inside its "cut".

The peculiarity of the interface lies in the fact that it is a technique with its own materiality (it organizes portions of matter), but it tends not to be perceived and has as much more success the less it is perceived. It enables an image, a sound, any kind of perceptual experience to occur, but is not part of the experience itself. It acts like a diaphanous substance[6].

The ability to distinguish between figure and background, the ability to locate a sound, the ability to recognize materials by manipulating them; the recognition of the depth of field, the elaboration of the linear perspective, the construction of devices to amplify the voice, the use of some objects to shape others; the coordination needed to type keys or manipulate strings, depending on what we want to hear or see; these are all cultural techniques. In all these cases, the matter is

4 *Ibid.*, p. 14.

5 Cf. *ibid.*, pp. 97-98.

6 The choice of the term "diaphanous" instead of "transparent" is not accidental. In fact, I intend to use the word "diaphanous" in a sense close to the technical-physical one, namely that of a partially transparent body. Although the interface is not necessarily *a* body, it is still a certain disposition of matter that *allows*, but also *conditions* the vision, or perception in general.

organized in a certain way to respond to anthropological or social needs; these material organizations, however, in turn, create a specific visual, sound, tactile landscape, which conditions the formation of new techniques and new social organizations. Ecologically and culturologically, they represent the co-production of society and technology[7].

(ii) The study of interfaces offers us an excellent case study to test a philosophy of media that aims to present itself as a theory of mediality. Interface is, in fact, the point exactly in «between media people and media machines»[8], the point where they encounter each other in mediation, the point in which mediality appears.

This last statement could lead to confusion. So far I have talked about the interface as a *technique*, as a certain way of organizing the matter, while now I use this topological metaphor, talking about a "place", or a "point". The fact is that the interface is a complex object and therefore allows different perspective descriptions.

Interface is a cultural technique, it is true. But this is perhaps partial, since it concerns the description of the interface from the *human* point of view. From a strictly technical point of view, it is also an object, organized matter, a piece of *material culture*. But it is an object in which (or thanks to which) interactions and intersections occur, being more similar to a place, to an environment, or better a *milieu*[9].

The fact that it has such a double description is an indication that it is really a point of *intersection*. It is an intersection between *cultural techniques* and *technical culture*. It can be described from different perspectives because it is multifaceted and ambiguous in its "essence". One can speak of it in *ecological* or *archaeological*, *materialistic* or *culturological* terms.

As an *inter-section*, the interface is both a place of communication and of separation. Most languages, in naming it, emphasize the element of communication ("*inter*face" in English or French, "*inter*faccia" in Italian), but the German language, on the contrary, exalts the break ("*Schnitt*stelle" is literally "the place of the cut"); but, even when the cut is highlighted, what is underlined is the *relationship* between what is on the one side and what lies beyond the aforementioned cut. This basic ambiguity, once again, emphasize the elusive and multiform reality of the interface, subject to multiple possibilities of description.

Later, in the next section, I will try to give a more general and unambiguous definition of this slippery term, but for the moment I am content to point out that, even following two opposite (but convergent) interpretative lines, we can reach the conclusion for whose the study of the interfaces will allow us to discover something more about the medial condition: whether the interface is intended as a cultural technique that takes shape in specific organizations of matter and perception,

7 Cf. R. Debray, *Introduction à la médiologie*, cit., pp. 87-88.

8 S. Zielinski, *Deep Time of Media. Toward an Archaeology of Hearing and Seeing by Technical Means*, tr. G. Custance, The MIT Press, Cambridge-London 2006, p. 10.

9 The French word *milieu* encloses in its polysemicity the meanings of "intermediary", "means" and "environment". Cf. Y. Citton, *Médiarchie*, cit., p. 44.

whether it is intended as the place where a cut separates, but also puts into communication different systems, analyzing it we will find ourselves in any case observe at the same time a *medium*, a process of *mediation* and *mediality* as a condition.

Studying the interface means studying a *medium*, because it means studying a portion of organized matter. The interface always has a physical existence and a material support consisting of one or more objects: a set of frame, canvas and painting, a headset, a page, a more complex apparatus suitable for producing certain perceptions. The interface is not only an object, but also a code, a convention, a rule for the organization of matter[10].

It is not always evident in its material configuration, it often tends to hide itself in order to make itself more functional and to better convey its own content: «[i]n front of a page of a book or a computer screen, we do not look at the page or at the screen themselves, but at the words or images that are there represented»[11].

The fact that it is not always evident is one of the causes of some possible emerging problems in the relationship between users and media. Precisely for this reason, trying to discover its functional architecture represents a fundamental step forward in becoming aware of its role and of the role of the medium in general in the production of our experience. This is the task of what we might call a *media analysis*.

But perusing the interface also means examining *mediation* in its happening. Each medium, if functioning, allows to see mediation processes; however a non-functioning standard medium simply becomes an inert object. The interface, instead, as a material *organization*, is an *operating presentification*, which implements mediation by simply placing itself. In a way, unlike other media, it coincides with the mediation process, in the sense that it is the material support of a specific type of mediation.

Treating the interface as an operating presentification means recognizing that it allows portions of reality to become visible, audible, touchable, but, at the same time, it *conditions* perception because it dictates procedures and operate through them. From another point of view: it *allows* sensory apparatuses to approach reality, but dictates the modalities of this approach. And it does all this simply by *interposing*, cutting and connecting at the same time.

The thesis that a given material organization can "tell" us what to see or hear may seem radical, but it will be clarified (at least as far as sight is concerned) in the following sections and, more broadly, in the next chapter where I will speak about *scopic regime*. For the moment it is enough to note that, in making an interface analysis, in addition to doing a media analysis, one cannot fail to do a *mediation analysis* at the same time.

After all, media analysis and mediation analysis are nothing more than the two main components of a good *media theory*, i.e. a theory that thematizes media in their operational essence, in their material configuration and in their relationship with time and temporality.

10 Cf. *ibid.*, p. 31.

11 *Ibid.*, p. 25, my translation.

To sum up: observing the interface allows us to frame a medium (although is not easy to recognize it, since it is a material organization that tends to hide itself), a peculiar mediation process that I have called operative presentification (a mediation that begins with the simple placing of the medium in question) and different elements, subjects, objects that are separated, distinct, but also putted in a certain relationship. In short, carefully observing the interface, observing it through the tools of a good media theory, confronts us with the *medial condition* in its unraveling. If mediality must become the true object of a philosophy understood as mediology, then using the interface as a privileged case study could be an excellent idea.

So far I have described the interface in very general and sometimes ambiguous terms. What is missing is a clear and unambiguous definition that cold be used as a starting point. The time has come to do it as systematically as possible.

2. Definitions.

I hope now appears clear why it is worth focusing on the interfaces in order to test a philosophy of media like the one proposed here. However the ambiguity of the object in question makes it difficult to embrace it in its generality. From here comes the choice to dedicate the rest of the work to the analysis of a more narrow field, on a particular form of interface. To circumscribe the narrow field, however, it is necessary to start from clear general definitions and it is indispensable to make some methodological distinctions.

2.1. General definition.

Rather surprisingly, in a fundamental lexicon such as *Critical Terms for Media Studies*[12], there is no definition of "interface" and this is quite strange given the crucial role that interfaces play in the relationship we have with media and technologies in general. Yet in that book the word we are trying to give a meaning as unambiguous as possible occurs several times; we can therefore try to collect the most interesting elements that accompany its occurrences and see if, by putting them together, we can find a satisfactory definition.

Referring to Bergson, Bernadette Wagenstein defines the body and the sensory experience «a literal interface to the world»[13]. She meant to say that «the body has the responsibility for organizing relations with the outside»[14] and it does this by subdividing the "universe of images" by means of perception, which «is a subtraction from the totality of images»[15]. This conception of perception as

12 W.J.T. Mitchell, M.B.N. Hansen (eds.), *Critical Terms for Media Studies*, University of Chicago Press, Chicago 2010.

13 *Ibid.*, p. 26.

14 *Ibid.* As for the concept of the body as an interface, it is also fundamental M.B.N. Hansen, *Bodies in Code. Interfaces with Digital Media*, Routledge, New York-London 2006. In that book Hansen wants to re-evaluate the role of the body as an interface and as an element that allows experiencing virtual reality, which is always an incorporated experience. Although it is correct to emphasize the role of the body and redeem it from a too "techno-centric" vision, if one wanted to move a criticism, one could say that it does not seem profitable to fall back into a new anthropocentrism that neglects the technological mechanisms of control over bodies.

15 W.J.T. Mitchell, M.B.N. Hansen (eds.), *Critical Terms for Media Studies*, cit., p. 26.

something that *cuts*, *selects* and *subtracts*, rather than as something that adds (as Kantian schematism would like)[16], fits very well in the logic of partition and distinction that we have seen to be a fundamental feature of the interface, justifying the definition of body as primary interface.

Bill Brown tells us that the interface analysis has to do with *phenomenology*. In saying this he express a truth, but a very partial one. Partial because the phenomenological account deals only with a specific type of interface – namely the one between users and technology –, while we, for the moment, are still looking for a general definition; moreover he intends the interface only in its meaning of mediation as a process, separating (and deeming irreconcilable, if not on a pure ideal level) the analysis of the medium as a technical object[17]. However, there is an element that we must retain: the phenomenological approach tells us that of interface also counts "what appears" (to one or another of the components put in relation), meaning that, although the elements of a system can be heterogeneous, they must be able to *appear* compatible, and this is exactly what happens in the interface.

Bernard Stiegler, in his chapter on memory, tells a very simple thing, but we cannot overlook: interfaces are «entry and exit organs»[18]. With this he intends, starting from his organological[19] perspective, that the complex of cultural, technical and industrial processes needs devices and organizations to materialize, and he identifies these in interfaces or *terminals*. Furthermore he highlights their two-way nature, their being *bidirectional*.

Mark Hansen, in his entry about new media, rather than defining the interface, defines the medium on the basis of it: «while the specific materiality of [...] technical logic is central here, what makes it a medium is the interface of this logic with human aesthetic experience»[20]. In other words we can say that what makes a medium a medium is its ability to generate mediation. That this is not part of the technical logic of the object design is actually questionable – in fact, as I hope I have made clear by now, I prefer to distinguish between media as operational *objects* and mediation as operational *process* –, but what we are interested in selecting and setting aside is this: in the interface *different orders* are put into *compatibility*, such as, for instance, the techno-mathematical logic and the human aesthetic experience[21].

16 It must be said that, although the author explicitly opposes the Bergsonian to the Kantian vision (defined as idealistic), in Kantian epistemology the *a priori* forms of sensibility and the categories serve to "organize" the world and therefore to select the portion for us perceptible and knowable. While it is true that, in a way, according to Kant, the senses are "added" to reality (because they have an active role and are not mere "gates" through which the external world flows), it would be more correct to say that they *structure* it and, in this sense, his theory of knowledge is very close to a mediological conception of body and perception as an interface.

17 Cf. *ibid.*, pp. 59-60.

18 *Ibid.*, p. 79.

19 Cf. B. Stiegler, *De la misère symbolique. Vol. I L'époque hyperindustrielle*, Galilée, Paris 2004, pp. 18 and ff.

20 W.J.T. Mitchell, M.B.N. Hansen (eds.), *Critical Terms for Media Studies*, cit., p. 183.

21 As I said before discussing the phenomenological proposal cited by Brown and as I will explain later on, the interface between user and technology is only a special case of interface, but here it serves well as an example.

However, different compatibility orders can also be found *within* the technologies themselves and, therefore, we also talk about interface in the moment in which a connection is made. For this reason Alexander Galloway refers to the interface as an *edge* between any two objects[22].

From what we have noted so far we can draw this first definition: the interface is something like a cut, an *edge* that works by *subtraction*, by diminishing reality and which, however, manages to create a communication *relationship* (*incoming and outgoing*) between *different elements*, whether we are dealing with technological apparatuses and human beings, whether we are dealing with objects belonging to the same technological system, whether we are dealing with the world and our way of conceptualizing it. In a sense, the interface works like the mathematical procedure of the *highest common factor*: it subtracts (or hides) incompatibilities to find the common point of contact[23]. The edge is its *locus* (its materiality), while subtraction and compatibility relationship constitutes its mode of mediation.

This definition may already clarify ideas, but it is necessary to smooth and simplify it in order to obtain a truly satisfying one. And at this point, I believe that nothing is simpler than the technical-IT definition: interface is a *connecting device*, gate or boundary capable of *ensuring exchange and communication* between two (or more) *systems*. To put it in more philosophical terms, we could say that the interface is the discovery of an *order of compatibility* and *metastable balance* between different orders previously in a state of instability[24].

With this last definition we can be sure of including both the interface between users and technologies, as well as other interfaces between, say, libraries of digital objects and their instantiations, between software and hardware or between hardware and hardware (USB gates, Ethernet, etc.); but also the relationship between our body, our perceptive apparatus and the external world can be defined in these terms; even the very first historical meaning of interface (in fluid dynamics) – namely that of «a dynamic boundary condition», «inherently active», that «would define and separate areas of unequal energy distribution within a fluid in motion, whether this difference is given in terms of velocity, viscosity, directionality of flow, kinetic form, pressure, density, temperature, or any combination of these»[25] – can be accepted within our general definition.

According to this definition, we can reiterate how the interface is at the same

22 Cf. *ibid.*, p. 292.

23 It should be noted that the word "subtraction" is perhaps not the most suitable and that this example of the highest common factor works best: the numbers whose common factor must be found do not lose their identity, do not disappear, do not add up or subtract, and yet a common element is found which maintains an operational relationship with them; in the same way, for example, reality and perception do not cancel or transform each other definitively, yet they find a point of encounter and compatibility.

24 This discovery of a metastable order is, in essence, what Simondon called *transduction*. Transduction is the operation that proceeds in phases, leaps, solution of tensions and problems, but that allows the conservation of information in its entirety. It does not seek the solution by saving only the elements in common between the terms of the problem and deleting the others, but discovers the dimensions in which communication between disparate orders becomes possible (cf. G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., pp. 32-34).

25 B. Hookway, *Interface*, MIT Press, Cambridge-London 2014, p. 59.

time a medium (as it has its own placement and its structured materiality) and a mediation process (as it is communication and compatibility in act), and how it represents the moment of mediality (since it assumes in itself the different elements and brings them to the medial condition).

The interface, understood in this way, assumes an unquestionable generality, but if we are interested in a mediology that deals with specific problems such as the question of the "power of media" on human beings in the digital age, then we must, while remaining aware of the general context, restrict the field to a particular case: Human-Computer Interface (HCI).

2.2. Computer interface.

The choice of computers as the main media to study the relationship between human beings and technology appears to be fairly obvious in the digital age, nevertheless it must be argued.

Does it make sense to talk about a digital breakthrough? Actually yes, but in what sense? Digital technologies have multiplied exponentially in recent decades, flanking and very often replacing analog ones; computers have taken on an increasingly central role in various aspects of economy, information, communication, and knowledge; digital data processing has become a standard in science, as well as in aspects of everyday life. At the same time, however, we know that when we speak of "digital age" we risk of speaking in general terms of a very specific and particular condition, which probably concerns mostly Western or highly industrialized countries. But is this really the case? Actually, there are at least two reasons to favor the study of digital technologies as representative of our current global situation: a sociological and a technical one.

The sociological motivation is based, very trivially, on the extent of the spread of computer media. Lowering prices and portable alternatives (smartphones above all) have made them truly global widespread tools[26]. In addition, beyond value judgments on the issue, the bulk of overall financial capital travels over computer networks. Moreover, the speed of communication – in an escalation that began with analog media and has now reached a higher peak thanks to wireless transmission on the one hand and the digitization of data on the other – has made every part of the world potentially within reach for us, in the direction of an authentic global village[27]. The fact that even revolutionary or terrorist movements from countries

26 In 2018, for the first time, more than half of humanity (51,2%) was connected to the Internet; 90% of the global population can (has the theoretical possibility to) access the Internet through a 3G or higher speed network; the proportion of people with effective internet access in developing countries rose from 7,7% in 2005 to 45,3% in 2018; the highest growth was recorded in Africa, where the percentage of internet users rose from 2,1% in 2005 to 24,5% in 2018; in developed countries, 83,2% of households possess a computer; the percentage drops to 36,3% in developing countries; the strongest growth rates were observed in the Arab States and the CIS region; in Africa, the proportion of households with access to a computer increased from 3,6% in 2005 to 9,2% in 2018. Cf. *ITU releases 2018 global and regional ICT estimates. For the first time, more than half of the world's population is using the Internet*, retrieved from https://www.itu.int/en/mediacentre/Pages/2018-PR40.aspx (accessed 20 March 2020).

27 Cf. M. McLuhan, *Understanding Media*, cit., p. 5. Regarding the reactions of closure – also of sociological importance and of decisive impact on politics – generated by the possibilities of connection given by the global village, see also *ibid.*, pp. 37-38.

not belonging to the so-called first world use information technology and the web is another thing that should make us understand that the phenomenon is not at all a western exclusive. Finally, it should be noted that the dynamics of power and of civil and political rights are being played out today on the control and on the possibilities of access to the Internet[28]: we can say, in short, that even those who today do not have access to a "digital life" are defined (and disabled) precisely on the basis of this impossibility and, in this sense, are a full part of the digital era. But not only the human world is conditioned and determined by the explosion of digital media: the so-called material economy and even geological balances[29] of our planet are also affected; from the growing consumption of electricity to the production of waste due to the obsolescence of material supports, passing through the growing need for infrastructure, everything seems to be linked in a double thread to the so-called immaterial or digital economy[30].

However, for the purposes of this discussion, we are more interested in the technological motivation for which it makes sense to take the computer interface as a paradigmatic case of interface as contemporary cultural technique. We could start from Marshall McLuhan's consideration that electronic media (which he, with a bit of terminological inaccuracy, calls "electric") are the culmination of the prosthetic process: if every medium is an extension (and, at the same time, an amputation) of an organ or of a human faculty, they (and the computer to the maximum degree) are the extension of no less than our central nervous system[31]. Since the methodological assumptions of the present work differ from the prosthetic vision (and replace it with the double logic of externalization and internalization), it is clear that I will not propose to accept McLuhan's teleological vision; however, although it is wrong to claim that the computer may be a prosthesis or has even replaced our central nervous system[32], it is undeniable that it has isolated some

28 Inequalities in access to technology and information have always been a system of control and a ground for political struggle. The fact that this is not a new phenomenon, far from discrediting the thesis of the novelty and generality of the digital condition, shows us just how today access to computer technologies is perhaps the main yardstick of inequality between classes, countries or subgroups.

29 See J. Parikka, *A Geology of Media*, University of Minnesota Press, Minneapolis-London 2015.

30 Cf. Y. Citton, *Pour une écologie de l'attention*, Seuil, Paris 2014, p. 19.

31 Cf. M. McLuhan, *Understanding Media*, cit., pp. 3-4, 47-48.

32 The echo of this theory expands to the transhumanist theories according to which it would be possible to upload human consciousness, or rather, completely simulate the mind, on a software. Such theories rest on a rather clear logical contradiction: on the one hand they start from a very physicalistic vision of the mind, according to which it is only a physical property given by the neural connections and by the biochemical processes inside the brain; on the other hand they pretend that, once all the neurological and biochemical processes are known, they could be simulated in order to run on a hardware completely different from the human "wetware", thus inaugurating a new form of dualism that considers the mind a separable substance able to be supported not only by different occurrences of the same architecture, but even by different architectures. In addition to this, it has to be demonstrated that it is actually possible (even in theory) to simulate the entire functioning of the human brain by means of a Turing machine; neurobiologist Miguel Nicolelis and mathematician Ronald Cicurel argue that brain architecture is partly based on indeterministic processes and, thus, that this is not possible (cf. R. Cicurel, M.A.L. Nicolelis, *The Relativistic Brain. How it works and why it cannot be simulated by a Turing Machine*, Kios, Natal-Montreux-Durham-São Paulo 2015).

patterns of what we identified as eminently human reason (e.g. calculating and deductive reason) and perfected them. Another famous McLuhan theory is that of re-mediation, according to which «the "content" of any medium is always another medium»[33]. In this case, again, the computer could place itself at the top of the "evolutionary chain" of media, since it would be the medium that re-mediates all *media*. However, the argument of re-mediation is slippery: as Alexander Galloway points out, it would be reductive to limit the function of a medium to that of containing other media, even if this means incorporating the entire condition[34] linked to those previous media[35]. Perhaps it might be more correct to talk about re-mediation in terms of modes of *mediation*: according to Kittler any medium either stores, processes or transmits information; computers do all three of these things, so they «in principle comprehend all other media»[36]. Or we could embrace the thesis of Galloway himself, who writes that computer «remediates metaphysics itself», since «[i]nformatic machines do not participate in the worldly logic of essences and instances, they simulate it»[37], taking the *medial* condition to a new level[38].

In any case, whatever the perspective (or combination of them) we decide to embrace, we could say that the computer is a sort of summary of our relationship with the media and has a general position among them. At least in this regard, even if we did exactly the same things with IT as we did with analog media, only in a different way[39], it makes sense to talk about "digital revolution" and "digital condition".

Today, to be fair, it would be tempting to say that we are heading towards a *post-digital* condition: on the one hand there is the nostalgic re-emergence of many analog media, on the other hand there is an increasing internalization of gestures connected to digital, as well as a hybridization between digital technologies and our

33 M. McLuhan, *Understanding Media*, cit., p. 8.

34 E.g. «television incorporates film itself, that is, it incorporates the entire, essential cinematic condition» (A. Galloway, *The Interface Effect*, cit., p. 20).

35 Galloway, on the basis of Kittler's analyses concerning the manipulation of the temporal axis in sound media (cf. F. Kittler, *Gramophone, Film, Typewriter*, cit., pp. 34–36), identifies in particular with errors, glitches or non-significant sequences the unprecedented possibilities given by a medium, which are therefore outside the logic of re-mediation. «A computer – he writes – might remediate text and image. But what about a computer crash? What is being remediated at that moment? It can't be text or image anymore, for they are not subject to crashes of this variety. So is a computer crash an example of non-media? In short, the remediation hypothesis leads very quickly to a feedback loop in which much of what we consider to be media are in fact reclassified as non-media, thereby putting into question the suitability of the original hypothesis» (A. Galloway, *The Interface Effect*, cit., p. 21).

36 Cf. F. Kittler, *The History of Communication Media*, retrieved from https://journals.uvic.ca/index.php/ctheory/article/view/14325/5101 (accessed 20 March 2020).

37 A. Galloway, *The Interface Effect*, cit., p. 20.

38 The fact of being able to simulate entire ontologies means that IT can give rise to new habitable environments (which could be the interfaces that we want to analyze here), in which mediation processes take place and which can therefore open up to new conditions of mediality.

39 Although someone can see it this way, due to many phenomena of skeuomorphism, this hardly corresponds to the truth: when we write an email we are not writing a letter; when we do online research we are not just consulting a huge archive; when we subscribe to a social network we are not entering a very crowded public space; in all these cases we are carrying out operations of manipulation of information within mediation processes unseen until a few decades ago.

own body[40]. However, if with the term "post-digital" we want to refer to a critical reflection on digital[41], to a full awareness of the influence of digital culture and technologies on our modes of perception, cognition and action, then we have to admit that *we have never been post-digital*.

For these very reasons, it makes sense today to consider digital interfaces of our computers as the privileged space for an investigation into the medial condition. Even at the IT level, however, the general definition holds that the interface is not only that one that separate and connect the *human* component to the *technical* one. As already mentioned, those between different hardware, the compatibility of a software with a hardware, or the thresholds between various software and programming levels, all fall under the general definition of interface. Nonetheless, the HCI has some peculiarities that make it an intriguing subgroup. But before observing these particularities, it will be useful to make some methodological distinctions.

We are used to conceiving the interface as a significant surface[42], as a place of choice and interaction. But operability does not always mean interaction and very rarely it means choice[43]. And, above all, interface is not always a surface.

Althought in the following chapters I will focus mainly on surfaces, it must be kept in mind that the superficial element (be it visual, auditory or tactile) is nothing but the last step of an overlap of levels that constitute an architecture, a palimpsest, a set of places of non-choice, a predetermined archive, a *paratext*. Galloway calls it "intraface".

2.2.1. Intraface.

Actually Galloway talks about intraface within a discussion of visual and aesthetic culture, but he says things that can take on a more general value even from the technological point of view that I am assuming. For this I will borrow his term and some of his definitions in order to describe the underlying levels of interface, those characterized by less choice and which concern the interaction of different components and not of human one.

The author describe intraface as the «imaginary dialogue between the workable and the unworkable: [...] *an interface internal to the interface*»[44]. Galloway speaks of a sort of border within an image, of a play between center and edge, but we can also take it more literally. If the intraface is a threshold between text and paratext, between transparency and foregrounding, between realism and function, between representation and metrics[45], then it is also the interface between the

40 I am talking about both wearable technology and implants.

41 Cf. C.U. Andersen, G. Cox, G. Papadopoulos, *Editorial*, in «APRJA Post-Digital Research», Issue 3.1 (2014).

42 "Significant surface" is the definition that Flusser (cf. V. Flusser, *Towards a Philosophy of Photography*, tr. A. Mathews, Reaktion, London 2000, p. 8) gives of image. As we will see, due to a widespread modernist bias, the identification of the digital visual interface with a particular type of image is still common.

43 The possibility of choosing in the discovery of a compatibility order, even if it is not predetermined, is always conditioned by the structures and the available material. In the case of digital technologies, then, the choice is often also predetermined.

44 A.R. Galloway, *The interface Effect*, cit., p. 40.

45 Cf. *ibid.*, p. 41.

levels of the machine that communicate with each other, but not with the component human.

The difference between interface and intraface is given by the fact that, if the interface is designed to find an order of compatibility between heterogeneous parts, the intraface is that through which a lower order gives instructions to the upper one, that fixes possibilities and limits according to itself. An interface is designed to give instructions, but also to receive feedback that the machine needs to continue operating[46]; the intraface, on the other hand, remains mostly a set of one-way rules. Both are designed thinking the *outside* (they contain a teleological element) and, therefore, in a sense, indicate «the implicit presence of the outside within the inside»[47], but the intraface is designed for an already known and predetermined outside.

The physical interfaces between different hardware are a typical example of what we call here intrafaces. This type of intrafaces is commonly constituted by a transmission medium (such as, for instance, a cable), two connectors and two gates. A rather common case is the connection of a computer with peripherals. These peripherals are devices designed to be used together with a computer, and the computer gates used to connect to them are designed with the aim of these possible connections («the implicit presence of the outside within the inside»). But even the internal components of a computer (the different elements of its architecture, or the audio and video cards inserted in it) communicate instructions through this type of intrafaces, the most common of which is the BUS (Binary Unit System)[48], of which also the USB is a special case.

With intraface we will also indicate hardware-software interfaces, such as, for example, *drivers*. A driver is what allows an operating system to use the hardware without knowing how it works: it abstracts the hardware considering its logical functioning and thus rendering it a computable object for the operating system[49]. A driver is specific both to the hardware and to the operating system; it has, therefore, specific design and projectuality, which make it, precisely, according to our definition, an intraface.

A third type of intraface can be the interface between different software. In some programming languages (particularly in object-oriented ones) the interface is a set of abstract methods[50] that act as connectors between similar components,

46 In this sense it could be said that many analog media do not have real interfaces, but rather iridescent surfaces hypothetically directed to human perception: a gramophone, once in operation, does not require feedback and continues to emit sounds even if no one is listening to it anymore; the same applies to a cinema screening; radio and television have some very limited possibilities for interaction (image or volume adjustment).

47 *Ibid.*, p. 42.

48 «A *bus* is an electronic highway in a digital computer that provides a communication path for data between the CPU and its memory and between and among the CPU and the various peripheral devices. A bus contains one wire for each bit needed to specify the address of a device or location in memory, plus additional wires that distinguish among the various data transfer operations to be performed» (E.D. Reilly (ed.), *Concise Encyclopedia of Computer Science*, Wiley, Hoboken 2004, pp. 76-77).

49 Basically a driver is a program or a subprogram that allows to control a hardware (or another software). Cf. *ibid.*, p. 285.

50 A method is a subroutine associated exclusively with a class and which represents an operation

which however have different internal structures. In essence, it is a question of creating internal software compatibility, e.g. between certain libraries and their specific uses. Also in this case we are faced with interfaces designed to connect lower orders and higher orders with a marked unidirectionality and a predetermined set of choices; for this they deserve the name of intrafaces.

2.2.2. Subface.

There is another type of eminently procedural interface: it is the one that Frieder Nake calls "*subface*" and that we could define as the algorithmic "essence" of phenomena that appear on the *surface* and are therefore part of the HCI. Nake, with reference to digital images, talks about particular types of objects, which are "algorithmic things". «The algorithmic thing – he states – comes as a visible appearance for us. At the same time, it comes as a computable appearance to the program. [...] It does not make any sense to talk about the computer image without keeping in mind its visibility *and* computability»[51], where visibility is the surface, while computability is the subface. «We do not usually have access to the subface. It is hidden, internal to the computer or the software system»[52], but we know that it determines the visual appearance of what we call "digital image". One thing on which the author strongly insists, moreover, is the impossibility of separating the surface-and-subface binomial[53].

However I do not believe that the definition of subface and of the surface-and-subface coupling holds only for algorithmic images. Subface is a constitutive element of every sensitive manifestation of a HCI, it is what remains «hidden and more or less inaccessible»[54]. This element is essentially logical and procedural, but what we need to keep in mind is that in computers, logic is first of all inscribed in those material components that are circuits[55]. The mathematical component of the subface, therefore, is also material at least as much as the surface. Also things are slightly more subtle than Nake's claim that «[t]he surface is analog, the subface is

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that can be performed on the objects and instances of that class. An abstract method is a method associated with abstract classes, i.e. those classes that represent concepts that are too general to have direct instances.

51 F. Nake, *Surface, Interface, Subface. Three Cases of Interaction and One Concept*, in U. Seifert, J.H. Kim, A. Moore (eds.), *Paradoxes of Interactivity. Perspectives for Media Theory, Human-Computer Interaction, and Artistic Investigations*, Transcript, Bielefeld 2008, pp. 92–109: 105.

52 Id., *The Disappearing Masterpiece. Digital Image & Algorithmic Revolution*, in M. Verdicchio, A. Clifford, A. Rangel, M. Carvalhais (eds.), xCoAx 2016: Fourth Conference on Computation, Communication, Aesthetics and X (conference proceedings), Bergamo, 7-8 Luglio 2016, pp. 12-27: 16.

53 Cf. *ibid.*, p. 20.

54 Id., *Surface, Interface, Subface*, cit., p. 95.

55 Shannon laid the foundations for the concrete implementation of the Universal Turing Machine developing a general theory of circuit design, translating Boolean logic into functional schemes ready to be constructed and used to carry out any logical operation, regardless of the content (cf. C.E. Shannon, *A Symbolic Analysis of Relay and Switching Circuits*, in «Transactions American Institute of Electrical Engineers», Vol. 57 (1938), pp. 38-80). The fact that the logical rules that underlie the operation of any software are physically inscribed in the silicon that forms the circuits is the main reason that leads Kittler to the statement that software does not exist at all, or at least that it «has no existence independent of machines» (F.A. Kittler, *There Is No Software*, in Id., *The Truth of the Technological World. Essays on the Genealogy of Presence*, tr. E. Butler, Stanford University Press, Stanford 2013, pp. 219-229: 224).

digital»[56]: in circuits the current flow is analog, but it is discretized in pulses, thus becoming material for the digital and algorithmic computation that takes place at the software level; the elements of the surface, moreover, as for example the screen, can be, as we shall see in the next chapter, in turn digital. This is because *analog* should not be confused with *material*: *digital is itself rooted in matter*. In light of this, I would define the subface as the set of the *fundamental logical-material architecture* (circuit design) of those components that *materially support* the emergence of a HCI (graphic or audio cards, but also screens) and of *the algorithms that regulate their operations*.

Now, since we called *intrafaces* the interfaces inside the machine and *subface* the fundamental techno-mathematical structure of phenomenological (visual, audible, etc.) appearances on the surface, from this point on, every time I will use the term *interface* without further specification, it will mean HCI.

2.2.3. Human-Computer Interface.

Speaking of human-computer interface, or user interface (UI), we therefore mean the outermost layer of the palimpsest to which we referred above. This interface is designed to make the computational processes phenomenologically understandable to the user, but also to collect user input, depending on the tasks they intend to perform. The *media* that support this type of interface are, for instance, the keyboard and the mouse, the speakers, the screen; in fact, the interface can be tactile, acoustic, visual or mixed (images or typing accompanied by sound, touch screen, etc.). The *mediation* modes that characterize these interfaces depend on the program that regulates their functioning, on the intrafaces that connect them to lower levels of computation, on inputs and outputs, in short from the set of processes at the center of which they are found. They – as thresholds between the computer and the user, between the computer and the world, and between the user and the virtual environment – open, or can open, to a condition of *mediality*.

For reasons that I will explore in the next section, the privileged object of my investigation will be *visual interfaces*. What must be noticed immediately, however, is that interfaces always deal with *perception*: the search for compatibility between human and machine always takes place on a *bodily-perceptive level*.

This is because, as Simondon well expressed, for the human individual, in its ontogenetic process, the search for new orders of compatibility takes place first of all on a perceptive level. The French philosopher distinguishes two stages of the process by which human beings "shape" the world: the sensation understood as tropism and perception as a process that inserts a direction into the tropistic polarization. In the tropism individuals begin to distinguish the hot-cold, acute-severe, luminous-dark dyads, and then realize that «thermal, tonal, chromatic qualities are differential qualities, arranged around a center that corresponds to an intermediate state, to a maximum differential sensitivity»[57]. Tropism does not yet capture objects, but elements such as dyad, midpoint, gradient. Tropism is not unity, but polarization of unity, or rather, set of polarizations of the original

56 F. Nake, *The Disappearing Masterpiece*, cit., p. 13.

57 G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., p. 258, my translation.

continuum. These polarizations mostly do not have a common vanishing point, they are not consistent with each other. It is to solve this tropistic problem that it becomes necessary to *give a form* (to *inform*). This information of portions of the *continuum*, following its polarization, is, according to Simondon, perception. «Perception – he wrote – is not the grasping of a form, but the solution of a conflict, the discovery of a compatibility, the *invention* of a form»[58]. The sense of a perception lies at the meeting point between the signals sent by the external world and the perceptive apparatuses of the living being, through the transmission of information: it is a process of mediation that allows the discovery of an order of compatibility that will favor psychic individuation, and therefore the moment of cognition and effective action towards the outside world.

For this reason interfaces must be designed in such a way as to address and affect human perception. They must be done in such a way as to suggest a direction, an information within the polarity between the human user and the medium, between the real world and the virtual environment. At the same time, they must be structured so as to allow human perceptive capacities to act by structuring the environment in relative autonomy. The interface, in order to perform its function in the best possible way, should in short act as a real *meeting place* between the human and the machine.

Furthermore, in order for the new compatibility state to last as long as possible, the interface must not only affect perception, but must also be able to capture *attention*. The link between information and attention was already theorized at the turn of the 60s and 70s of the twentieth century by the "discoverer" of the *attention economy*, Herbert Simon. This link is substantiated by an inverse proportionality: an information-rich world is an attention-poor world. In other words, *information consumes attention*[59]. The discovery of the attention economy lead us to observe how much the so-called immaterial economy has always had a concrete impact on the material economy, even before the digital age: in the industrial era the rarest of goods is not so much the material goods itself to be produced as the attention required to consume them[60]. This is why, according to Günther Anders, there are no crises of overproduction, but rather of underconsumption: the discrepancy between supply and demand is given by the fact that consumers, although they can potentially (physically and economically) consume further, have no desire to do so. The solution devised by the market is to produce "second-degree desires" through advertising[61]. In other words, capitalism must capture the attention of the consumer.

However, the digital revolution has brought about major changes in attention economy. Simon wrote that «*[a]n information-processing subsystem (a computer or new organization unit) will reduce the net demand on the rest of the organization's attention only if it absorbs more information previously received by others than it produce*»[62]. And, in fact,

58 *Ibid.*, cit., p. 235, my translation.

59 Cf. H. Simon, *Designing organizations for an information-rich world*, in M. Greenberger (ed.), *Computers, Communications, and the Public Interest*, The Johns Hopkins University Press, Baltimore 1971, pp. 37-72: 40-41.

60 Cf. Y. Citton, *Pour une écologie de l'attention*, cit., p. 25.

61 Cf. G. Anders, *Die Antiquiertheit des Menschen II*, cit., p. 16.

62 Cf. H. Simon, *Designing organizations for an information-rich world*, cit., p. 42.

computers do exactly that: thanks to their speed, they save time on individual operations and, therefore, they free attentional energies of other components (human ones, in particular), which could be directed towards other tasks. If, however, hypothetically, the energies released could be directed in the most disparate directions, it is easy to see how often they are reabsorbed into always new digital activities[63]. This is certainly desired by an industry that gains more and more through the *capitalization of attention*[64]. A clear example is Google, which requires our constant attention to collect data on our preferences, which will then be resold to other companies[65]: attention no longer serves to produce needs in order to sell us other products, but itself becomes the main product of the current stage of the market economy.

However, it should be borne in mind that the constant demand for attention on the part of digital media does not have exclusively economic purposes: such media are in fact designed with the need, in order to perpetuate their functionalities, to receive input and feedback from other components, such as the human one. In other words, they require attentional resources in order to function; they consume attention in order to continue to provide information. Not only that: the economistic paradigm can be criticized for its excessive methodological individualism, which hardly manages to explain how widely standardized processes, such as those of digital media, manage to capture the attention of each individual[66].

Yves Citton proposes a paradigm in which to better frame and explain both the economic success of corporations that exploit attentional energies and the general involvement of attention in the functioning of digital media. This paradigm is that of *attentional regimes*, which treats attention as a *collective* more than an individual phenomenon and which underlines the role of environmental and medial (*mediaspheric*[67]) influences on it. And it is precisely within this paradigm that the role of the interface in relation to attention can be better understood.

Starting from the assumption that attention is always an interaction (attention is always directed to something), Citton treats it as one of those transindividual dimensions that restructure the individual, who does not pre-exist to the relationships that constitute it[68]. From this point of view, the environment, interwoven with relationships (which also includes the media that help to structure it), acts as a *resonance infrastructure* that conditions our attention[69]. A central role in such a resonance structure is played by what Aristotle called the "formal cause", i.e. «the importance that a pre-existing form exerts on the progress of an operation»[70].

In the light of this concept of formal cause, we can finally understand what exactly is meant by attentional regimes: human attention is directed towards objects in which it recognizes forms, under the impulse of a sort of environmental

63 Cf. Y. Citton, *Pour une écologie de l'attention*, cit., pp. 99-100.
64 Cf. *ibid.*, pp. 73 and ff.
65 Cf. *ibid.*, p. 26.
66 For further objections to the economization of attention see *ibid.*, pp. 43-44.
67 Cf. *ibid.*, pp. 50-51.
68 Cf. *ibid.*, p. 45.
69 Cf. *ibid.*, p. 52.
70 *Ibid.*, p. 53, my translation. See also M. McLuhan, E. McLuhan, *Media and Formal Cause*, NeoPoiesisPress, Houston 2011.

attention, thus arriving at a *collective composition of individual desires*[71]. In essence, it cannot be said that attention, as a collective phenomenon, is not therefore individual; rather, it is true that even if each one has slightly different individual perceptions[72], the attentional regime – i.e. the general framework that dictates the direction of these perceptions – is collective[73]. This collective composition and this general direction allow a certain homogenization of human behavior, which corresponds to (and is conditioned by) technical standardization[74].

The role of interfaces in this domain is to act as a *catalyst* for transindividuality. This means that they must be able to constantly capture individual attention (which is an individual instance of collective attention) and direct it towards the standardization required by the machine, which demands that, whatever the user, he or she is able to perpetrate its operation. How it *directs* perceptions and attention should be quite clear to us by now, both in the light of what Citton said about resonance infrastructures, and of what I wrote at the beginning of this chapter about interface as cultural techniques. However, it remains to be seen how it *captures* attention.

To understand this, one must observe the diagram theorized by Dominique Boullier, and reported by Citton[75], in which four attentional regimes, which are supposed to over-determine individual attentions, represent the extremes of two axes: the x-axis is constituted by the polarity between *projection* and *immersion*, while the y-axis by that between *alert* and *fidelization*. The thesis that I propose and for which, in fact, I will seek confirmation during the next two chapters, is that HCI plays its game within the quadrant delimited by the poles of alert and immersion. But there is more: the combination of alert and immersion creates a surrogate for fidelization. The human individual, in fact, under the constant stimulus of alert and tending towards immersion, is fidelized not so much to the content, but to the medium itself.

In conclusion, it is necessary to provide an exhaustive definition of interface (intended as HCI), taking into account what has been said so far. This definition will be as follows: the interface is a *zone of intersection*, supported by a *material medium*, which *translates* computational processes, *mediating them into phenomenologically perceptible forms* for the human being; it must also be able to *capture attention* so that the human component continues to provide the computer with the *necessary feedback* to make it work; on the other hand, it *brings the human component into a medial condition*, by *connecting the human perceptual milieu and the media resonance milieu*, making the human being *informatically present in the world* and consequently conditioning his ways of perceiving and acting.

3. Visual (interface) culture.

According to the definition just provided, the interface translates computational

71 Cf. Y. Citton, *Pour une écologie de l'attention*, cit., pp. 57-59.

72 Every attentional regime is always also a perceptual regime. We will see this better in the next chapter when discussing the scopic regime.

73 Cf. *ibid.*, p. 65.

74 Cf. *ibid.*, pp. 107-108.

75 Cf. *ibid.*, p. 69.

processes into sensitive data, susceptible to perception by the human component. Of course this includes different types of interfaces such as tactile, acoustic, and visual, all of which help to capture and direct attention. They are, for example, the keyboard, the mouse, the screens (normal or touch screen), the speakers, the microphones, etc. However, in the continuation of this work, I will limit to the analysis of visual interfaces as a privileged case study and I will do so for some reasons that I will try to summarize in this section.

First of all, what do we mean by "visual interface"? It is a computer interface supported by an optical technology (typically a screen), which translates computational operations into visual outputs perceptible to the human being. On the optical medium, the interface can take on a textual or graphic form, depending on the chosen mode of mediation. In current devices, the *graphical user interface* (GUI) has almost completely replaced the *text-based user interface* (TUI)[76], given the numerous advantages offered by the greater possibilities to attract attention, to make commands intuitive, to facilitate interaction by manipulation of icons.

One could say that the visual interfaces communicate with the human component through "images", but this would not be entirely correct, since, more than with images, we are dealing with peculiar objects that I will call log.*icons*. By log.*icon* I mean an object characterized by a mixture of logical element and iconic element, with a connected symbolic reference to a content that is "other" – never, therefore, properly "content", but always external – compared to the physical nature of the signal and the medium that constitute the necessary material substratum of such an object. One can also speak of log.*icon* in terms of *algorithmic image*, in close connection with the processes of archiving and micro-archiving that necessarily accompany it. What distinguishes the log.*icon* from the image is the fact that there is an intermediate layer in it, between its source and its phenomenological manifestation. Different types of log.*icons* can be distinguished[77], but in all of them there is the logical layer of the techno-mathematical codification. In essence, these are images that have, from the point of view of the machine, a logical nature; but they may also be defined as data that have the purpose of being visualized. This should make us understand why visual interfaces are an interesting object of study to test our conception of mediology: in them are particularly evident those processes of mediation and perceptual translation of which we have spoken above.

In this desire to privilege the iconic element alongside the logical one, one could perhaps recognize the phantom of *oculocentrism*, often indicated as a

76 A TUI does not contain graphic elements, but only text strings, and allows you to interact with the computer by typing written commands through a keyboard. Some more advanced versions allowed the use of the mouse, but, in fact, only to move the cursor across the lines of commands. Today TUI survives only in the command-line interface (CLI), usually used only by programmers, developers and system administrators.

77 I distinguish three of them: measurement (reality-data-image), scanning (image-data-image) and creation (programming an image using data). The technical characteristics of the production and display of digital images will be discussed in greater detail in the next chapter.

fundamental figure of our cultural tradition[78], starting from Greek θεωρία[79]. In reality, this phantom is only fed by the sharp division between different perceptual and mental domains which, if one considers technical-cultural production as a mechanism of externalization/internalization, loses its meaning. In this sense, although the visual dimension does not have a necessary ontological priority, it cannot be discredited either, since it represents one of the forms of the aforementioned mechanism.

Moreover, it is a matter of recognizing that the visual, starting from the eye, involves the whole body; this means that the experience of the visual, as we understand it here and as it appears to be also the one stimulated by the interfaces, is far from the conception of pure contemplation. The discovery of *mirror neurons* has led neurosciences to the theory of *embodied simulation*, which significantly supports the concept of visual experience proposed here: the sight of an action, real or represented (even in static images), activates the mirror neurons which are sense-motor neurons which, in other words, preside over the movement or predispose it[80]. The fact that sense-motor neurons are activated even just for having observed something, indicates a sort of internal simulation of an action (imitative or in response to what has been observed). This predisposition to action generated by visual experience already leads us to understand what close link there is between (in this case visual) perception and action, and how, therefore, different modes of visualization can induce or at least predispose to different actions.

But there are also reasons, perhaps more contingent, but certainly of cultural importance, for which it makes sense to dedicate to visual interfaces: when we interact with a computer today, we mostly do so by manipulating visual elements, and even when we produce texts or communicate in writing, we do so through the mediation of optical technologies. Even most sound interfaces (from notifications to listening to music) refer to information or manipulation and navigation possibilities that occur on the visual interface. Information technologies seem to have followed the "iconic turn" that characterizes the culture of "return of images" in which we find ourselves today.

Béla Balázs referred to this renewed centrality of visual events when celebrating the advent, or rather the return, of a *visual culture*, thanks to the cinematograph, a new sense organ, a new perceptive faculty[81]. Since then, our visual environment has only grown: the rhizomatic proliferation of artistic, commercial, technologically produced or reproduced images has only increased the archive that constitutes the *a priori* of our experience. Not only that: an archive is no mere accumulation, but also selection and, therefore, also consists of lacunae. The images

78 Cf. A. Pinotti, A. Somaini (eds.), *Teoria dell'immagine. Il dibattito contemporaneo*, Cortina, Milano 2009, p. 19.

79 The Greek word θεωρία – hence the word *theory* – initially indicated a ritual procession, which was first and foremost a spectacle for the eye, as is also testified by the etymology from which it derives, i.e. the verb θεάομαι which means "I observe", "I contemplate".

80 Cf. D. Freedberg, V. Gallese, *Motion, emotion and empathy in esthetic experience*, in «TRENDS in Cognitive Science», Vol. 11, N. 5 (2007), pp. 197-203: 199 and ff.

81 Cf. A. Pinotti, A. Somaini, *Cultura visuale. Immagini, sguargi, media, dispositivi*, Einaudi, Torino 2016, pp. 4-5.

multiply, but some of them are also obscured, deleted[82]. This is precisely the reason why the visual environment is so dynamic and constantly changing.

On closer inspection, the prevalence of the GUI over TUI also seems to be a sign of the times; moreover, as we will see in the next chapter, alongside a technical history of media support made up of breaks and discontinuity, there is also a more linear cultural history of forms of visual fruition that seems to lead exactly in this direction. But are we really facing a *return* of *images*? Maybe it is not a return and maybe it is even simplistic to talk about images.

If we want to tie the birth of the production of images to the *iconic difference*, which Boehm links to the concept of *pictorial difference* found in Jonas, we discover that the anthropological origin of the different forms of poietic production of artifacts lies in a «faculty of stylizing the mobile perceptual field of everyday vision»[83]. Such a faculty not only presides over the production of pictures or images, but of visual events in general and of light regimes, scopic regimes, in short, perceptive interfaces with reality that take place in the field of vision and that modify their forms throughout history (without abandoning it at any time to return to others). Today, rather than a return of images, we are faced with a restructuring of the field of the visible through new interfaces in which digital technologies play a preponderant role.

In short, screens and visual interfaces are now ubiquitous and shape our access to information and to the world itself. For this reason, not only can they not be ignored by mediology, but they can also become the subject of privileged investigation for the study of media, mediation and mediality.

4. Digital thresholds.

The ubiquitous interfaces and screens we refer to are, as mentioned above, the digital ones, i.e. those that put human beings in contact with the informatically produced environment. In the next chapter we will deal with the emergence of this particular type of interfaces from a strictly technical and historical point of view, but here we need to reconnect to the issues raised in the first part of the chapter and ask ourselves *what kind of cultural technique is the digital interface*.

Throughout history, different metaphors have been used to describe sight and visual interfaces: door, window, grid, filter, frame, etc[84]. Some of them have also become pictorial, graphic, cartographic models, thus educating our vision according to their particular directives. What I want to note now is that none of these metaphors are adequate to describe digital visual interfaces. The most appropriate metaphor today is that of the naked *threshold*[85].

The other metaphors also refer to forms of thresholds, but all too present and heavy. When I speak of a *naked* threshold I mean something that has its own materiality, but is so subtle, so little perceptible, that it gives the illusion of a direct,

82 Cf. G. Didi-Huberman, *L'image brûle*, in «Art Press», special issue no. 25, 2004, pp. 68-73.

83 G. Boehm, *Die Wiederkehr der Bilder*, in Id. (ed.), *Was ist ein Bild?*, Fink, München 1994, pp. 11-38: 31, my translation. See also H. Jonas, *Homo Pictor: Von der Freiheit des Bildens*, in G. Boehm (ed.), *Was ist ein Bild?*, cit., pp. 105-124.

84 Cf. B. Siegert, *Cultural Techniques*, cit.

85 Cf. A.R. Galloway, *The interface Effect*, cit., p. 25.

not mediated, access. It is, or want to be, transparent; it is, or pretend to be, a place for exchange and communication. While the old door logic presupposed «an asymmetry of knowledge» or «an information gap»[86], the digital interface gives the illusion of immediate and equal access, without barriers; it methodically conceals itself and, the more it becomes invisible, the more successful it is in its purpose. The interface seems to have reached the maximum of operability: the exchange appears «perfect, optimal, immediate»[87]. But if the exchange appears immediate, it is mediation that risks to cancel itself, to destroy itself, to become "unworkable". This is one of the perils of what I will call "ideology of transparency", which, by obscuring the role of mediation, risks alienating various components of the system, particularly the human one, from the medial condition.

Before closing this chapter – hoping to have provided a sufficient definition framework on interfaces and to have explained why digital visual interfaces are of special interest to mediology – it is convenient to understand what I mean by "ideology" and, in this particular case, by "ideology of transparency". The term "ideology" is used here to indicate a system of ideas, perspectives, material organizations that aims to create a synecdochical regime in which a partial vision of reality is mistaken for the totality of it. The ideological trait of the digital interface derives from its partiality and self-concealment. As an interface, it cuts and organizes: it is not neutral, therefore, but literally provides a *point of view*. Self-annihilation, however, hiding the cut, raises a claim of *objectivity* and *totality*. This, as already said before, is not a new phenomenon: every kind of visual interface has always tried to hide itself and to present its own as an objective perspective; what differentiates the digital interface, however, is its success in the assertion of transparency.

In conclusion, we can say that digital interfaces represent the main contemporary cultural technique and that their design is designed to adapt the expressions of the machine to human perception, but also to capture human attention and to bring the human being to think *with* and *according to* the machine; human action is enhanced by technical prostheses, but the "posture" of the human being (as well as his way of living in the world) are modified. This makes them an object of great interest for a philosophy understood as mediology interested in the question of the power of the media, that is, their influence on human perception, cognition and action.

The definition of interfaces as intersections and problematic knots of perception and disposition to action allows us to break down the problem of interface *politics*[88] into two facets of the question: the *aesthetic* one and the *ethical* one. If interfaces capture attention through perceptual mechanisms and if they modify the modes of perception themselves, then the realm of inquiry is the aesthetic one. If they prepare and direct action, then we are faced with ethical problems, not necessarily understood in a moralistic sense, but which require a theory of action that can deal with the theme of human-machine coupling.

These are the themes that will be addressed in the following, starting from the

86 B. Siegert, *Cultural Techniques*, cit., p. 201.
87 A.R. Galloway, *The interface Effect*, cit., p. 26.
88 Cf. *ibid.*, pp. 44 and ff.

aesthetic one. This is not so much because perception precedes action (after all, we have seen that perception is always already a predisposition to action), but above all to overcome a prejudice that is still rooted in contemporary discourse on visual interfaces, namely the *modernist prejudice*.

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For a long time computer-mediated interfaces have been analyzed as special kind of *images*, in the light of an approach based on *modern aesthetic consciousness*. This approach is not only quite outdated, but it cannot even really deal with the question of the *power of images*; that is, it fails to explain how such "images" influence our cognition and action to such an extent. But why did we begin to look at digital interfaces in this modernist perspective, despite all the post-modernism and despite the various criticisms of aesthetic consciousness moved within and outside the art world? Probably this is due to an author, namely Lev Manovich, and to his influential work *The Language of New Media*.

As Alexander Galloway rightly notes, Manovich describes media and technological objects in general «as poetic and aesthetic objects»[89]. Hence the formalist approach in defining a "language" of new media. According to the old logocentric prejudice that wants a clear separation between *lógos* and *eikón*, these aesthetic objects must be "explained", made intelligible by language. When Manovich enumerates the already mentioned[90] five principles of digital technology – numerical representation, modularity, automation, variability, and transcoding[91] – he understand them as if «they describe some of the aesthetic properties of data»[92].

One of the reasons why, according to Galloway, Manovich falls into this modernist approach is that he concentrates exclusively on software, and therefore on the *appearance*, so to speak, of digital. For this reason, in the next chapter I will try to focus on the problem of vision not so much in the light of the concept of image, but rather in the light of the concept of interface, and I will show why modernist aesthetics are inadequate from a philosophical, technical and historical-cultural point of view. Finally, I will propose to frame the analysis of the visual interfaces in the light of an aesthetic based on the study of perception.

89 A.R. Galloway, *The interface Effect*, cit., p. 3.
90 See *supra*, p. 49.
91 Cf. L. Manovich, *The Language of New Media*, cit., pp. 27-48.
92 A.R. Galloway, *The interface Effect*, cit., p. 3.

IV. Perception: Visual Interfaces and Techno-aesthetics

The analysis of visual interfaces calls aesthetics into question. This statement can be understood in two different ways. The first one is apparently more banal, but the objective of this chapter is precisely that of rehabilitating it and connecting it to ethical and political issues: man-computer visual interfaces have to do with αἴσθησις, with senses (especially with sight).

The second way, traveled by various scholars, is to frame the question of informatically mediated images (and therefore also the visual nature of interfaces) in the context of an aestheticization of society[1] and in the debate concerning the power of images.

This last line of thought, although variegated and of many nuances, can be traced back to some fundamental presuppositions: (I) an ontological difference between λόγος and εἰκών, between language and representation; (II) a conception of the virtual as a different and separate plan of reality, when not even as hyperreality in which images no longer refer to reality, but become reality themselves[2]; (III) an aesthetic understood in the Kantian and post-Kantian sense, in terms of modern aesthetic consciousness and of judgment on beauty.

1. The failure of aesthetic consciousness.

I have already discussed (I) in the introduction, but it is worth repeating one thing: precisely the digital turn allows us to rediscover the co-originality of logic and iconic, of linguistic and figurative dimensions. Therefore, those theories that attribute some problems of subjectivity found in today's fruition of technologically mediated images to this passage from a continuous narrative "I" to a fragmented "I" as constructed through images[3], seem to be inaccurate. This does not mean that there has not been a transition from a continuous subjectivity to the fragmented subject of post-modernity; however, this passage must be decidedly backdated and corresponds basically to the emergence of analog (not only visual) media, which have separated and specialized functions once held to be intrinsically human[4].

1 Cf. V. Campanelli, *Web Aesthetics How Digital Media Affect Culture and Society*, NAI, Rotterdam 2010, p. 13.

2 Cf. J. Baudrillard, *Simulacra and Simulation*, tr. S.F. Glaser, The University of Michigan Press, Ann Arbor 1994, pp. 22 ff.

3 Cf. F. Vercellone, *Il futuro dell'immagine*, il Mulino, Bologna 2017, p. 98.

4 If previously writing was able to record memories – but only in the form encoded by language, characters, grammar –, with analog *mass media* even the ability to remember sounds, voices, images is externalized. Such externalizations then have a return to the interior, where they are able, as will be seen, to break through the barrier of consciousness to act, through *physiological* channels, directly on the unconscious: even the production of *unconscious* content is "outsourced" to *artificial* external means. Using Kittler's words: «in mass media, whatever is unconscious becomes the focal point itself» (F.A. Kittler, *Weltatem. On Wagner's Media Technology*, in D.J. Levine (ed.), *Opera through Other Eyes*, Stanford University Press, Stanford 1994, pp 215-235: 222).

(II) leads us to believe that a different plan of reality must be treated and analyzed with different tools and aesthetics becomes the chosen one, since visual interfaces are made to fall into the realm of images and – by virtue of (III) – it is believed that aesthetics must deal with images. It must be said that, indeed, the peculiar *operational ontology* of digital media seems to authorize this misunderstanding: IT technologies create worlds and populate them with entities; the possibility opened up by computer technologies to create worlds, or in any case to navigate on worlds that are ontologically different from one another, gives the impression, in daily use, of acting exclusively on fictitious worlds, not on the real world. In this sense even the technologically mediated images are conceived as entities belonging to a different world, unreal or hyperreal. However, by virtue of a causal principle of reality[5], the virtual environment of informatically mediated communication is not something separate nor causally closed with respect to the so-called "real world". Each digital entity or course of action is generated and has consequences in the real world and is always traceable to the physical reality of the signal transmission. In this sense, informatically mediated images are neither more nor less real entities of other entities in the real world; they are also part of the same real world.

Regarding (III) we should first note how the "prejudice on beauty" is also transferred to the analysis of visual interfaces. One of the reasons why visual interfaces are supposed to be the subject of aesthetic analysis is that they are treated as images; and images, in a certain tradition of thought now rooted even in the common sense, are the object of judgments of *taste*. That a work of art should be *beautiful* is an idea that comes from afar[6], but the concept of an aesthetic judgment as a judgment on the beauty (of art or of nature) so systematized and up to the present day, is usually traced back to Kant. This idea considers aesthetic experience (mostly visual) as disinterested, not conceptual, and regulated by a "free use of imagination". To be fair, even for Kant aesthetic ideas give *thought*, despite their non-conceptual character, and are produced by the imagination stimulated by *experience*[7]. The almost "irrationalist" extremism of Kantian ideas (and in particular that of sublime) is due to romantic thinkers[8], while in Hegel we find a more rigorous systematization, which however definitively sanctions the prejudice on beauty and limits aesthetics almost exclusively to the philosophy of art[9].

What the Kantian and post-Kantian theories highlight and try to transpose in the study of visual interfaces is the essentially a concept of *free* relationship between a *free* subject and the production and fruition of images. As will be seen shortly, to checkmate this conception of aesthetics in its relationship with the visual interfaces is precisely the conditioning power of the latter which makes it difficult to continue to support a position of free use.

5 Cf. T. M. Powers, *Real wrongs in virtual communities*, cit., p. 192.

6 Cf. W. Tatarkiewicz, *A History of Six Ideas. An Essay in Aesthetics*, tr. C. Kasparek, Martinus Nijhoff, The Hague-Boston-London 1980, pp. 121 ff.

7 Cf. *KU*, Ak., Bd. V, 316-317 ; I. Kant, *Critique of Judgement*, cit., pp. 145-146.

8 Cf. J. Kirwan, *Sublimity. The Non-Rational and the Irrational in the History of Aesthetics*, Routledge, New York-London 2005, in particular pp. 67-102.

9 Cf. G.W.F. Hegel, *Aesthetics. Lectures on Fine Art*, tr. T.M. Knox, 2 vols., Clarendon Press, Oxford 1975.

The post-modern crisis of the idea of subjectivity, by the way, has prompted several scholars to reconsider this position, while remaining (or trying to remain) in a Kantian horizon, recovering and developing the concept of *sublime*[10].

Costa argues that it is precisely in the age of computers and networks that it is possible to artificially produce the condition of the sublime, an undertaking in which art has failed. Current digital technologies represent artifacts actually produced by humans, which, however, by their very reticular nature, tend to go beyond subjectivity. Moreover, if the feeling of the sublime arises not so much from an object as from an activity, then it seems to agree well with the operational nature of digital media. The "technological terrifying" has given rise to the virtual threat of the expropriation of human nature, but its being repeatable and socializable places us safe and allows us, indeed, to expand our subjective possibilities: hence the sublimity[11].

In this concept of technological sublime there are two things that give trouble. First of all, for Costa's own admission «nothing that has taken the form of the symbolic can be really considered sublime»[12], but it is evident that digital belongs to the order of the symbolic, at least to the extent that it can be reduced to its source code. Costa describes the category of the sublime as aroused by «real things or occurrences» and seems to oppose the real to the symbolic (because the sublime is inexpressible). But, as said by Kittler – who makes abundant use in his works of the Lacanian categories of real, symbolic, and imaginary –, the symbolic «is simply an encoding of the real in cardinal numbers»[13]. This makes the symbolic (discrete, mathematized, algorithmic) definitely different from the real (continuous, analog), but connected to it by a direct reference relationship; moreover this makes clear that the world of the machine is a world of the symbolic. Therefore if we take the category of the sublime as good we must decide either that there can be no technological sublime or that the symbolic can also be sublime.

The second problem has to do with the idea that the recovery of the sublime category can emancipate aesthetics from the reference to a subjectivity. On the one hand, in fact, Costa states that the technological sublime emphasizes the *aseity* of the work or object: the attention is posed more on the signifier (and therefore on the technical-medial *a priori*, on the physical dimension) than on the meaning. This leads to the emancipation of the technological object from the reference to a subjectivity, as well as to the decline of a subject as a user and of the artistic personality as creator. On the other hand, however, the author emphasizes the aesthetic-sensorial experience (opposed to the contemplative one, but always referred to a subject) and greets the advent of a "hyper-subjectivity" which resembles the Simondonian transindividual, which, however, despite its body made of networks, continues to be a subjectivity, whose potentials are even broadened in the direction of exceeding the individual limits.

At this point I will have to clarify why an aesthetic that refers to a

10 Cf. J.-F. Lyotard, *Anima Minima*, in Id., *Postmodern Fables*, tr. G. Van Den Abbeele, University of Minnesota Press, Minneapolis-London 1997, pp. 235-249.

11 M. Costa, *Il sublime tecnologico. Piccolo trattato di estetica della tecnologia*, Castelvecchi, Roma 1998.

12 Quoted and translated in V. Campanelli, *Web Aesthetics*, cit., p. 55.

13 F.A. Kittler, *The World of the Symbolic – A World of the Machine*, tr. S. Harris, in Id., *Literature, Media, Information Systems*, ed. J. Johnston, OPA, Amsterdam 1997, pp 130-146: 140.

consciousness or a subjectivity encounters difficulties in dealing with visual HCI: an aesthetic founded on the freedom of the subject (individual or collective that is) clashes with the problem of conditioning images.

For a long time[14], aesthetics have neglected the power of images, that is their ability to arouse emotions and reactions that go beyond the appreciation or rejection purely inherent in taste. This question becomes dramatic in the age of mass images, even more through media such as television and the world wide web. The image, in fact, does not only raise emotions (fear, enthusiasm, joy, disgust, etc.), but can also determine perception, cognition, action of human beings.

This power of the image can be identified in the cut. The style of the image is based, starting from painting, up to photography, cinema and video, on the double logic of inclusion and exclusion, which determines the creation of a landscape[15]. This logic materializes in the frame, in the frame, in the shot, in the angle view, in the analogical montage; in other words, in the stylistic and material limits of the image.

Even digital technologies (as discretization of a continuum) and the visual interfaces of these technologies are based on the logic of cutting and partiality. This is what makes them "ideological"[16], reassuring, concluded, a remedy to the disorientation that the breadth of the possibilities of the universal machine can generate.

However, what determines the ideological victory of an image is the dissimulation of the frame itself. The interface constitutes a perceptive threshold[17], mediated by a material support which tends to dissimulate itself in order to favor our assimilation in a virtual environment in which applies a fetishistic logic (we know that the "folders" or "pages" that we see on our screen are not real folders or pages, but we treat them as if they were).

Thanks to the power of the dissimulate cut of the interface, we access a partial and limited (and therefore apparently controllable) world which, however, gives an illusion of wholeness. We have the image of a portion of reality that appears to us as a whole world: is a "picture-world"[18].

This concept finds a parallel in that of *Reizmodell* expressed by Günther Anders. What Anders calls "phantoms", that is radio-television products, are actually, in his opinion, masked judgments. Judgments, as such, may contain truth, but always remain partial. However, if they are taken for objects, and therefore for factual reality, then he will be all the more subject to the negative character of the judgment, that is the limiting and conditioning one's action. The totality of

14 At least until D. Freedberg, *The Power of Images. Studies in the History and Theory of Response*, University of Chicago Press, Chicago 1989.

15 Cf. F. Vercellone, *Il futuro dell'immagine*, cit., p. 74.

16 Cf. W.H.K. Chun, *On Software, or the Persistence of Visual Knowledge*, in «Grey Room», 18 (Winter 2004), pp. 26-51. Wendy Chun talks about software as a *functional analog* of ideology. What makes it functional is the fact of appearing as perfectly regulated by laws of cause and effect (as well as the deterministic narration of an ideology), so as to present itself as a direct extension of the user's action and thus to conceal the threshold that it separates her or him from it.

17 Cf. A.R. Galloway, *The Interface Effect*, cit., pp. 54-77.

18 Overturning the Heideggerian concept of "world picture" (*Weltbild*). Cf. M. Heidegger, *The Age of the World Picture*, in Id., *The Question Concerning Technology and Other Essays*, cit., pp. 132-133.

phantoms will represent only a partial vision of the world, while pretending to represent it in its entirety. This prepared image of the world has therefore a pragmatic function, in the sense of a limitation of human praxis; it is «an instrument in the form of a pseudo-microcosmic model, which, on the other hand, pretends to be the world itself»[19]. The author calls it *Reizmodell*[20], a model which leads us to follow certain patterns of behavior depending on the distorted image of the objects it gives us. This model, although partial, to be effective, must mask itself as if it was the whole reality.

With this idea Anders refers to content (visual and not only) mediated by analog media, but the *Reizmodell* can become an explanatory model also as regards the influence of digital media on human perception and behavior: like a veritable *Reizmodell*, computer technology creates worlds that are microcosms, but present themselves – with the help of interfaces – as if they represented the whole world, and imposes modes of perception, cognition and action on the human beings.

This conditioning power of images and interfaces clashes with a concept of free aesthetic consciousness, or at least poses a problem: how can free fruition remain *free* if the objects of this fruition put conditions on it?

In order to find an answer to this question every aesthetic conception that refers to (III) should try to make a distinction between those images that allow free use (and perhaps development of transindividual potential) and ideological images, which limit and condition human freedom[21]. Indeed, it is difficult to detect boundaries or catalog which images can favor individuation and integration and which instead cause conditioning, stiffness and eventually *iconoclash*[22], since, if the conditioning power of images resides in the cut, then each image and each visual phenomenon mediated by optical media possess this power.

However, it can not be denied that if the success of the conditioning depends on the concealment of the frame, on the fact that the image manages to disguise itself as a world, then the contemporary optical media and, even more, digital media have intensified the conditioning power. This could lead us to believe that the visual interfaces are more powerful than traditional images, but it would not deny the power of the latter.

An aesthetic approach to visual interfaces based on (I), (II), and (III), therefore, is affected by considerable weaknesses and seems to ignore some technical-material specificities that should instead be taken into account in the analysis.

On the other hand, the problems in which this conception takes place would not arise if we considered the power of images, which had always been

19 G. Anders, *Die Antiquiertheit des Menschen I*, cit., p. 164, my translation.

20 Literally: "stimulus model", with reference to the stimulus-response model (*Reiz-Reaktions-Modell*) of behaviorist psychology. Just as in the behaviorist perspective, in this case Anders intends the "stimulus" as something totally determinant, that is something that *induces* a behavior.

21 Cf. F. Vercellone, *Il futuro dell'immagine*, cit., p. 74.

22 With "iconoclash" Bruno Latour intends «what happens when one does not know, one hesitates, one is troubled by an action, for which there is no way to know without further inquiry whether it is destructive or constructive», that is, that situation which shows an awareness of the power of images and which can result in iconoclasm or not (B. Latour, *What is Iconoclash? Or is There a World Beyond the Image Wars?*, in B. Latour, P. Weibel (eds.), *Iconoclash: Beyond the Image Wars in Science, Religion, and Art*, The MIT Press, Cambridge-London 2002, pp. 15-40: 20).

conditioning; if we considered them, that is, in their autonomy[23].

In any case, it is necessary to ask, more radically, whether it is really correct to consider visual HCI as an algorithmic and digital translation of the "image" category. The track that I propose to follow, in fact, takes as its starting point the genesis of optical – both analog and digital – technologies, with particular attention to screens, privileged material supports of visual interfaces, and their technical characteristics. I will not retain the visual character of the interfaces as a symptom of the aesthetization of society and the re-emergence of the iconic; rather I will try to investigate the technological and material reasons of the aesthetization of interface. In addition we must ask the question on the ontological status of digital images and ask if the visual interfaces have to do only with the images.

2. Reductionism.

In essence I will adopt an approach that could be called techno-materialist and even techno-deterministic. It may seem radical, but I think that, in order to identify the specific "nature" of media, this is the most effective path. Once the ontological questions that underlie the manifestation of visual interfaces are clarified, we will then be able to return to aesthetic issues.

In what sense do I speak of a techno-materialist thesis? In the sense of a reductionism of the ontological analysis on media to their constitutive elements, physical and material, but also to their technical-functional schemes and, in the case of digital media, to the logic embedded in the circuits that makes binary computation possible at the level of the hardware even before that of the software.

And in what sense, however, I refer to techno-determinism? This position can be summarized with Kittler's sentence: «media determine our situation»[24]. Of this tradition of thought are part theoreticians and philosophers different from each other, some apocalyptic, other techno-enthusiasts. Among these we can count Günther Anders, Harold Innis, Marshall McLuhan, Friedrich A. Kittler. The fundamental point of this approach consists in not considering the technological apparatus as something completely at our disposal. The technical structure conditions the way we act, think and even perceive; even the inventive act, which allows the emergence of new technologies, is linked to the conditions of possibility offered by the already existing technical elements[25], by the technological *a priori*.

23 In his critique of aesthetic consciousness Gadamer attacks the process of subjectivation of aesthetic experience, proposing instead to consider the work of art in its autonomy that transcends both the author and the audience. Even Gadamer remains within the frame for which aesthetics is reduced to philosophy of art, but he introduces an important element that must be taken seriously: the autonomy of the object of aesthetic experience. Cf. H.-G. Gadamer, *Truth and Method*, cit. pp. 37 et seq.

24 F.A. Kittler, *Gramophone, Film, Typewriter*, cit., p. xxxix.

25 In Simondon's theory on the mode of existence of the technical object, the elements play a fundamental role. They are not technical objects in themselves, since they do not have a functional autonomy or an associated environment. Yet they are like crystallizations of technical operations (cf. G. Simondon, *Du Mode d'existence des objets techniques*, cit., p. 81) and are for the machine what the organs are for the human body. It is from the elements that passes what Simondon calls *technicality*. When elements with a certain technicality are available, then the genesis of a new technical object can arise from them. The technical progress is due to this: the technicality is transmitted at the level of the elements and the elements have the power to

For this reason, in order to discover and describe the essence of technical objects and media, it is not necessary to refer them constantly to their human users or inventors, but it is instead useful to analyze them *per se*.

Following this thesis we may find that some faculties considered intrinsically human are in fact determined from time to time by different "sensitivity technologies"[26]. On the other hand we might realize that machines are better able to implement portions of our reason – e.g. computational reason – that we considered essential, and that instead could be culturally, socially, historically determined.

According to this position, therefore, it is not the "spirit" (*Geist*) that has produced technical and cultural manifestations, from writing to the computer, but it is rather the opposite. According to Kittler, for example, «[h]andwriting is not the external appearance of an already present inner individual; on the contrary, the inner essence came about by the training of "mouth, hand, voice, handwriting"»[27]. Kittler takes the example of handwriting[28] – overturning it – from Hegel[29]. But Kittler's purpose is not so much to do as Marx towards Hegel, but rather to play «Marx to Foucault's Hegel by turning discourse analysis onto its media-technological feet»[30]. The matrix of all this discourse, in fact – although anticipated or developed in parallel by other authors – is mainly post-structuralist.

Kittler's approach, as well as the techno-deterministic approach in general, does not completely ignore the human component, that of desires, aspirations and inventive leaps; it simply shows how often the desires are induced by the technical apparatus itself[31] or how without a technical *a priori* similar desires could not even be produced. For instance, romantic literature with its imaginative charge, the moving performances of magic lanterns, and, finally, the possibility of capturing images from reality with photography have created the conditions – but also the desire – of cinema[32].

I will try to apply this type of approach to the study of the evolution of screens and of the genealogy of visual interfaces to discover the origin of their current appearance and the functionalities to which they fulfill in the context of the

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transmit the technical causality along an evolutionary line (cf. *ibid.*, p. 94). The example preferred by Simondon is that of the thermionic valve (cf. *ibid.*, p. 80), which has no function if not inserted in a more complex equipment, but which can be part of countless different machines and which represented a decisive breaking point in the history of technology, constituting in fact the birth and the condition of possibility of the electronics.

26 I draw and translate this expression from the book: P. Montani, *Tecnologie della sensibilità. Estetica e immaginazione interattiva*, Cortina, Milano 2014. Kittler explains how even the idea of the soul has changed with the change of technology: from the wax tablet on which the experience inscribes, to the film of their life that passes before the eyes of the suicides (cf. F.A. Kittler, *Optical Media*, cit., p. 35), not to mention the subsequent computational metaphors.

27 G. Winthrop-Young, *Kittler and the Media*, cit., p. 45.

28 Discussed in F.A. Kittler, *Discourse Networks 1800/1900*, cit., pp. 83-84

29 Cf. G.W.F. Hegel, *The Phenomenology of Spirit*, tr. M. Inwood, Oxford University Press, Oxford 2018, p. 127.

30 G. Winthrop-Young, *Kittler and the Media*, cit., p. 59.

31 For a similar point of view, although more markedly pessimistic, on the desires induced by the technical apparatus see G. Anders, *Die Antiquiertheit des Menschen I*, cit., p. 171.

32 Kittler (cf. *Optical Media*, cit., p. 48) criticizes Friedrich Pruss von Zglinicki, who, in his monumental work *Der Weg des Films*, Rembrandt, Berlin 1979 (cf. p. 12), argues that humanity has always cultivated a sort of ancestral desire for moving images.

machine's logic.

Before going into the heart of the analysis I have to make a final methodological clarification. A media philosophy that takes a techno-materialistic approach risks ignoring every human-related cultural aspect in favor of exclusive attention to the machine. Sometimes it is actually like that and it even becomes a programmatic aspect[33]. However I will adopt a more similar perspective to that of the last Kittler, as well as some of his direct pupils[34], aimed at also considering the aspects related to the so-called cultural techniques. This outlook could be define as "culturological", in the sense expressed by Pinotti and Somaini: they define the cultural dimension as «constructed, artefacted, technically determined, socially, ideologically and emotionally situated, historically variable»[35]. In this case also cultural facts and related techniques are studied *per se* and in their materiality, with particular attention to the conditioning network that produced them, that is in a non-human-centered approach, which, however, does not ignore connections with the human dimension.

3. Archaeology of optical media.

To free the field from the "aesthetic prejudice" I will stop, for the moment, to talk about *visual* media, technologies or interfaces and I will start to refer to *optical* technologies. While the term "visual" refers to the content of a vision, "optical" recalls the physical dimension and the process that makes visible the visible. Visual can be a painting, while optical is the technology behind it, such as the linear perspective that organizes and determines the visible field.

With the expression "optical technologies" we want to include those media and devices too often ignored by visual studies, as they are considered out of the aesthetic or "cultural" (in the most naive sense of the term) precincts. I refer, for example, to radar, to closed circuit surveillance, to night vision cameras. The latter are an excellent example: theirs is «an optical technology capable of extending and reorganizing the visible field, making it possible to include what was previously invisible», «electronically amplifying the light already present in the environment»[36].

The optical media therefore have mainly to do with reception, transmission (think of the fiber optic), and storage (more or less temporary) or visualization of physical signals. With optical media and technologies, therefore, we mean the material supports, techniques and technologies that make a certain visual manifestation possible[37].

The first optical technologies could be considered more like cultural techniques, such as linear perspective. After a "prehistorical" stage, characterized by the invention and development of the *camera obscura* or the *laterna magica*, the first true optical medium was reached: analog photography.

33 Cf. W. Ernst, *Medienwissen(schaft) zeitkritisch. Ein Programm aus der Sophienstraße*, Humboldt Universität, Berlin 2004.

34 See B. Siegert, *Cultural Techniques*, cit.

35 A. Pinotti, A. Somaini, *Cultura visuale. Immagini, sguardi, media, dispositivi*, cit., p. XV, my translation.

36 *Ibid.*, p. XIII, my translation.

37 Cf. F.A. Kittler, *Optical Media*, cit., p. 19.

3.1. Analog and digital.

Although it was initially used with analogous or auxiliary purposes to those of painting – for example, for portraits or photographs of landscapes to be sold as models to painters –, analog photography is characterized as a process of radically different image production compared to any previous art, as well as eminently technological. The photographic process is an optical and chemical process aimed at fixing certain light conditions on a photosensitive material. On the one hand the real physically inscribes a trace of itself, on the other the type and quality of the material, of the lens, of the apparatus determine the appearance of the resulting vision.

The radical difference compared to the previous figurative arts becomes evident in its neatness after the affirmation of the reproducibility through negative introduced by Talbot's calotype (and then perfected thanks to the introduction of films) on the daguerreotype, initially considered of greater value due to its uniqueness. This diversity does not result in the fact that photography cannot be artistic. Simply photographic art (although often in competition with painting or at the center of debates on its artistic status[38]) has developed through its own path and with its own specific techniques.

The case of digital photography is still different and equally interesting. There is a debate between those who stress breaks (e.g. W.J. Mitchell, V. Flusser[39]) and who highlights continuity (e.g. W.J.T. Mitchell, C. Marra) between analog and digital photography[40]. Marra has emphasized some continuity very well, thus defending digital photography from accusations of non-artisticity. He, for example, noted how unfounded it is to attribute to analog photography an inability to lie, since it too is always *simulation*[41]; moreover he tries to remove the opposition between index and

38 On the one hand we have those who consider photography as an important chapter in the history of art (cf. H. Schwarz, *Art and Photography. Forerunners and Influences*, ed. W.E. Parker, University of Chicago Press, Chicago-London 1987); on the other hand those who, even today, maintain that it is not art at all, but "only" technology, as the journalist and art critic Jonathan Jones: see his articles for The Gurdian *Flat, soulless and stupid: why photographs don't work in art galleries*, retrieved from https://www.theguardian.com/artanddesign/jonathanjonesblog/2014/nov/13/why-photographs-dont-work-in-art-galleries (accessed 20 March 2020) and *The $6.5m canyon: it's the most expensive photograph ever – but it's like a hackneyed poster in a posh hotel* retrieved from https://www.theguardian.com/artanddesign/jonathanjonesblog/2014/dec/10/most-expensive-photograph-ever-hackneyed-tasteless (accessed 20 March 2020). Obviously the poles of the debate are that of those that show how art has always used techniques to express ideas and concepts or to transmit sensations (and photography is just one of these techniques), and that of those who think that technological progress has put in the hands of anyone who wants easy-to-use tools to reproduce images, but that these instruments are not able to transmit the same emotions of, say, a painting.

39 Normally Flusser is considered among the break theorists, but in reality the real break reported by the Czech philosopher is that between traditional and *technical* images. For him there is, so to speak, a sort of continuity in breaking: electronic images follow the same *logic of abstraction* that guides the production of technical images in general – including analog photography –, but they take it to its extreme consequences (cf. V. Flusser, *Into the Universe of Technical Images*, tr. N.A. Roth, Minnesota University Press, Minneapolis-London 2011, p. 47).

40 For an overview see A. Böhnke, J. Schröter (eds.), *Analog/Digital – Opposition oder Kontinuum? Zur Theorie und Geschichte einer Unterscheidung*, Transcript, Bielefeld 2004.

41 Cf. C. Marra, *L'immagine infedele. La falsa rivoluzione della fotografia digitale*, Bruno Mondadori, Milano 2006, p. 124.

icon, also in relation to the notion of code[42]. The conclusion reached by Marra is that, from the point of view of aesthetics, one can not speak of a radical difference between the analogical image and the digital image[43]. However, from the point of view of a media ontology, it would be necessary to underline both a point of continuity between analog and digital, and a point of radical discontinuity.

Regarding the continuity we must say that the optical procedure inherent to the lenses is the same[44] and that the input, even in digital photography, consists of a light impression, which, instead of hitting a photosensitive film, affects the grid of photosites (small portions of a semiconductor element) that constitutes the surface of a sensor like the CCD (Charge-Coupled Device). This process is essentially analog: the stronger the light that hits a single photosite, the more electrons will gather on it, just as, on a photosensitive film, more silver bromide atoms will clump in the areas hardest hit by light[45].

The element of fundamental discontinuity of the digital, instead, is that of codification, but in the sense of the *numerical*. The sensor behind the lenses measures the light intensity and does so already by dividing it into discrete units (the photosites), which correspond to the pixels that will compose the resulting image; once the measurement has taken place, it is translated (by an analog-to-digital converter, namely the signal conditioning that, coupled with the sensor, forms the transducer) into binary numerical data corresponding to discrete electrical signals, stored into a memory unit; this data can then be re-converted, using a translation *algorithm*, into images that can be visualized by different optical media. The introduction of the numerical has consequences on the ontology of the digital image that we will investigate later. Meanwhile, we limit ourselves to noticing how digital photographic devices are actually, in principle, *measuring instruments* that has to do, on a technical level, with the optician, but not necessarily with the visual. In analog photography we have a system to chemically reproduce an optical impression; in digital photography we have a system to create digital strings of data that represent the measurement (and therefore numbering) of light rays.

42 Cf. *ibid.*, p. 86-94.

43 Although Marra proves to be very well informed about the technical functioning of the photographic equipment, he neglects an important element that establishes a media-ontological difference between analog cameras and digital cameras: a digital camera is an electronic device whose circuits, therefore, translate logical operations into hardware; Marra underestimates this point and, in fact, argues that there is no hardware without software and that "the scrap" makes sense only as a function of the program (cf. *ibid.*, p. 43). In fact, especially as regards electronic equipment, the opposite is true: there is no software without hardware (or, as Kittler would say, there is no software at all), since it is precisely the Boolean logic incorporated in the hardware that allows the emergence of the software (see C.E. Shannon, *A Symbolic Analysis of Relay and Switching Circuits*, cit.).

44 Cf. Marra, *L'immagine infedele*, cit., p. 45.

45 Cf. *ibid.*, p. 53. Of a different opinion is Wolfgang Hagen (cf. *Es gibt kein digitales Bild. Eine medienepistemologische Anmerkung*, in L. Engell, B. Siegert, J. Vogl (eds.), *Licht und Leitung - Archiv für Mediengeschichte*, No. 2, Bauhaus-Universität Weimar, Weimar 2002, pp. 103-110), who claims that the operation of the CCD has to do with quantum mechanics and with particle physics (electrons, photons) of which there are no images at all. But it may be objected to Hagen that, from the physical point of view, even analog photography has to do with the same particles, as Marra points out.

By the way, starting from this example concerning photography, we can draw two theses: (i) sensitivity technologies follow what Kittler calls "logic of escalation"[46], according to which the emergence of a technology brings with it the opening of the possibility for the emergence of additional technologies and devices; (ii) the emergence of new optical technologies changes the scopic regimes and the relationship of human perception with images. The linear perspective organizes the space and distinguishes the foreground and the background; photography introduces the possibility of an indexical relationship[47] of the image with the real, that allows to preserve an "objective" memory, but, at the same time, due to the photographic cut, the chemical and material mediation, the possibility of photo editing, translates this portion of real in the imaginary[48]; digital photography makes the reproduction of reality at the same time more precise (as it adapts to the shooting conditions) and more easily manipulated, and, thanks to its rapidity of use, modifies our relationship with the external space vision (sometimes perceived as a function of its reproducibility) and with the fruition of images.

3.2. The conditioned vision.

But what is meant by "scopic regimes"? To better explain this term we must start from the assumption that the gaze is always situated: it is historically, culturally, socially, ideologically, politically, sexually determined and conditioned. A rather radical thesis, for a long time debatable, links this dependence of the gaze not so much to the development of a critical look towards certain styles, rather to the development of the gaze itself, in the sense of its *visual skills*[49]. The expression "scopic regime" is formulated for the first time by the film theoretician Christian Metz[50] and its meaning is expanded by the historian of culture Martin Jay[51]. This notion is aimed at denaturalizing the gaze and the vision and describes the different visual experiences that are located in different cultural contexts.

The theory of scopic regimes is not without difficulty and has been widely criticized. Arthur Danto[52], for example, while accepting that an image can tell us a lot about the way in which a culture sees the world, intends this "sees" in a figurative sense and not in the sense of a real visual experience. Indeed, even to us it may appear difficult to imagine a different visual perception by reading the lines of Jay in which he speaks of Cartesian rationalistic subjectivism or the Baroque optical regime; but let's try to think of a relatively close example: for its

46 Cf. F.A. Kittler, *The History of Communication Media*, cit.

47 Cf. A. Bazin, *The Ontology of the Photographic Image*, tr. H. Gray, in «Film Quarterly», Vol. 13, No. 4. (Summer 1960), pp. 4-9: 8.

48 Once again, the term "imaginary" is used in the Lacanian sense, reinterpreted by Kittler.

49 To introduce the hypothesis through the concept of "period eye" is Michael Baxandall in *Painting and Experience in Fifteenth-Century Italy. A Primer in the Social History of Pictorial Style*, Oxford University Press, Oxford 1973.

50 Cf. C. Metz, *Le signifiant imaginaire*, in «Communications», 23 (1975), pp. 3-55: 44. Cited in A. Pinotti, A. Somaini, *Cultura visuale*, cit., p. 130.

51 Cf. M. Jay, *Scopic regimes of modernity*, in H. Foster (ed.), *Vision and Visuality, Discussions in Contemporary Culture*, Bay Press, Seattle 1988, pp. 3-23. Cited in A. Pinotti, A. Somaini, *Cultura visuale*, cit., p. 131.

52 Cf. A. Danto, *Seeing and Showing*, in «Journal of Aesthetics and Art Criticism», 59 (2001), pp. 1-9. Cited in A. Pinotti, A. Somaini, *Cultura visuale*, cit., p. 132.

contemporaries, impressionism was not shocking only in terms of technical innovations; they even thought the figures in paintings as those of Monet or Berthe Morisot were indistinguishable[53]. Today, although we recognize that these are just sketched figures, we admire the mastery thanks to which, with a few brush strokes, the artist has managed to make the impression of defined figures admirably. The fact is that our eye, accustomed to considering impressionism and that type of "sketched" images in the canon not only of art history, but of the vision itself, sees, in essence, in a different way from that of a visitor to the *Salon des Refusés* of 1863.

Speaking of "scopic regime" means linking the theme of the historicity of the gaze to the *dispositifs* that condition it: it means that the gaze is always conditioned by the historicity and contingency of those that Deleuze called "regimes of light" (which are also "regimes of desire"), of the media, of the technical apparatus as a whole (what Benjamin called *Appartur*)[54].

Accepting the thesis of the scopic regimes in a techno-deterministic perspective means recognizing that the changes in the regime are also conditioned and perhaps above all by the emergence of new *optical technologies*. For this reason, in order to understand the nature of visual HCIs and their conditioning power, it is worth taking a look at the history of their conditions of possibility.

3.3. Genealogy of the interface.

One of the fruits of the techno-materialist and techno-deterministic position is the thesis that the conditioning power of digital interfaces does not pose problems, since the image has always been conditioning. This is due to its partiality that manages however to pass itself off as a whole world. The interface is precisely what makes conditioning possible: it opens to the image or to a virtual environment and, dissimulating itself, it makes the sense of boundary of this environment lose and favors immersivity (which is one of the conditions for the impression of wholeness, together with internal coherence).

The interface is always a material threshold, whether we are talking about technologies, or about cultural techniques: it ranges from the arrangement of elements in a space, to the frame, to the screens.

The influence of visual interfaces on the scopic regimes is due in particular to their capacity for illusion. An example is the linear perspective, which, guiding the eye towards a vanishing point, creates the illusion of observing scenes and landscapes as if we were in the same place and from the same point of view of the artists who reproduced them. Precisely for this reason, the introduction of linear perspective in painting in the early Renaissance must have produced the same amazement subsequently generated by 3-D images.

3.3.1. Linear perspective and *Camera Obscura*.

The linear perspective was certainly a fundamental cultural technique and has to do with mathematical relationships. But Kittler expounds a fascinating thesis, though more supported by good arguments than by evidence: the perspective was born thanks to the *camera obscura*.

53 Cf. L. Leroy, *L'Exposition des impressionnistes*, in «Le Chiarivari», 25 aprile 1874.
54 Cf. M. Carbone, *Filosofia-schermi*, cit., pp. 93-95.

The first evidence regarding the *camera obscura* as a system for projecting landscapes to be live drawn dates back to 1515 with Leonardo da Vinci's *Codex Atlanticus*, so almost a century after the application of linear perspective. However we cannot be sure that Leonardo was really the first one to use it for this purpose. We know instead that William of Saint-Cloud used a similar procedure to observe on a screen a solar eclipse as early as 1292; we know that Alhazen in the eleventh century (if not al-Kindi in the ninth), an Arab mathematician, was probably the first to build working models of *camera obscura*; and, going even farther back, we know that the functional principle of this optical technology is already enunciated by (pseudo-)Aristotle in the *Problemata*, always as a procedure to observe an eclipse without damaging the eyes. Precisely from the experiments on angles and refraction of light, the Arabs – and in particular Harun al-Rashid – first worked out trigonometry. European scholars, who came into contact with these discoveries, imported the rudiments of trigonometry, but, like their Arab colleagues, they «had anything other than simple empirical methods of conveying such trigonometrical functions. In modern language, such functions are transcendent»[55]. The values of sine, cosine, tangent, and cotangent were therefore available only in very little practical tables such as those of Regiomontanus, which, moreover, multiplied each value by a factor of ten million, since the decimal numbers were still unknown.

According to Kittler, trigonometry in its embryonic state, due to its lack of convenience and practicality, has not been of any help or impulse to the birth of linear perspective, although it is based on the same principles as that. Consequently, even the first artists who applied the new technique must have used similar empirical methods to obtain it.

Kittler reports a passage from Tuccio Manetti's account of Brunelleschi's life in which a work, now lost, is described, which would show how the Florentine artist and architect already had and used a *camera obscura*. This work was a «small panel about half a *braccio* square on which he made a picture showing the exterior of the church of S. Giovanni in Florence», namely the Baptistry in front of S. Maria del Fiore. This painting presented, according to Manetti, an extraordinary level of realism and detail. This was evidently a perspective painting, since «the painter had to select a single point from which his picture was to be viewed, a point precisely determined as regards height and depth, sideways extension and distance, in order to obviate any distortion in looking at it (because a change in the observer's position would change what his eye saw)». In the Middle Ages there was not the problem of a realistic pictorial representation, since religious painting had to represent transcendence. It was not a problem that the figures were two-dimensional, since the support on which they were painted was actually two-dimensional. For this reason Brunelleschi's contemporaries' gaze was not trained to see three-dimensional illusions in two-dimensional drawings: the painter had therefore to be sure that, in order for his painting to be perceived adequately, the viewer's gaze would not move from the vanishing point that he had come up with. To do this he adopted this expedient:

> On the picture side of the panel the hole was as small as a bean, but on the back it was

55 F.A., Kittler, *Optical Media*, cit., p. 52.

> enlarged [through the thickness of the panel] in a conical shape, like a woman's straw hat, to the diameter of a ducat or slightly more [i.e. 2.3 cm]. Now, Brunelleschi's intention was that the viewer, holding the panel close to his eye in one hand, should [turn the picture away from himself and] look [through the hole] from the back, where the hole was wider. In the other hand he should hold a flat mirror directly opposite the painting in such a manner as to see the painting reflected in it. The distance between the mirror and the other hand [holding the panel] was such that, counting small *braccia* for real *braccia* [i.e. measured in the same scale as that which obtained between the painting and the real thing], it was exactly equivalent to the distance between the church of S. Giovanni and the place where Brunelleschi was assumed to be standing when he painted it[56].

Kittler decides here to embrace the theory of Japanese art historian Shigeru Tsuji, who, after making calculations based on the size of the panel, the distance between the observation point and the observed scene, the lighting conditions of Piazza del Duomo and other elements, concludes that Brunelleschi's picture must have been drawn by means of a *camera obscura* placed at the cathedral's entrance[57].

If this was the case we would be faced with an optical medium that allowed the birth of linear perspective, which in turn revolutionized the viewers' gaze and reintroduced and strongly perfected the imitative paradigm in art. It is no coincidence that the same optical medium, which first shows the possibility of reproducing reality through a luminous trace coming from reality itself, is at the basis of the birth of photography.

The characteristic duality of optical reproductions can already be glimpsed here: in the moment in which the possibility of producing representations directly from the real is discovered, the element of illusion that must deceive the spectator is introduced, causing him to believe that he is observing the real itself. For this reason too, in agreement with Kittler, we place these forms of representation under the Lacanian category of the *imaginary*, rather than under that of the *real*.

3.3.2. *Laterna Magica* and the screen.

The technologically mediated illusion continues and is perfected with the *laterna magica*. *Laterna magica*, essentially, is an inside-out *camera obscura*: the light source is internal and the hole projects it outside; a system of concave mirrors and, later, lenses amplify it, while figures in front of it are magnified and "animated". It is one of the most direct predecessors of cinema, or rather one of the apparatuses that constitutes its technical *a priori*. And above all, it introduces the *screen*, as a constitutive element, although separate and interchangeable, of the optical medium.

From the point of view of the history of language we must note a semantic change with respect to the word "screen". As still evident from the meaning of the verb "to screen" that retains the sense of "conceal, protect, or shelter (someone or something)", the term (the english "screen" as well as the german "*Schrim*", the italian "*schermo*", the french "*écran*") is probably derived from the old high german "*skirm*" or from the lombardic "*skirmjan*", both connected to the meanings of

56 This and the previous quotes by Tuccio Manetti are reported *ibid.*, p. 55.
57 Cf. *ibid.*, p. 60.

protect, defend and hide[58].

The screens were originally panels or pieces of furniture similar to a *séparée* or sheets of light and semitransparent material, often used to shelter from the fire of a fireplace. As early as 1500 there were small portable silk screens for ladies and, later, screens of this kind began to be decorated with scenes related to fashion, aesthetic pleasures, or erotic games, thus becoming instruments of vision as well as shelter[59]. However, this visual function was simply auxiliary. To conceive the screen as an optical instrument we must wait, in fact, the *laterna magica*.

The supports for the projection of *laterna magica* could be either real screens (sheets of semitransparent materials), or curtains of smoke or steam[60]. In these cases the *laterna magica* was, for the most part, positioned behind the screen, so that it could also be moved back and forth to make the figures leap towards the audience, thus increasing the illusion of movement[61]. The screen therefore assumes in this case the double function of concealment (of the technical apparatus responsible for the production of images) and of access to the world of that spectacle which was called *Phantasmagoria*[62].

The illusion of *Phantasmagoria* was amplified by the effect of immersion obtained through the darkness, an expedient also adopted by cinema. When we think of the immersivity we probably think of an individual fruition, yet the darkness in the room offers us an experience of collective immersion that, in the case of cinema, has been increasingly perfected thanks to the sound, up to the Dolby Surround. Moreover, even the first visual devices designed for individual immersion, i.e. the peep shows, were in fact the object of collective enjoyment, during fairs or markets[63]. And the same fate would befall Edison's Kinetoscope, whose fruition was individual, but which found its place in crowded halls.

3.3.3. Prehistory of cinema.

The Kinetoscope (conceived in 1888 and realized between 1889 and 1890) gives us the opportunity to talk about a new level of illusion: the illusion of movement of images photographed from reality. This illusion is not produced by shifting a light source back and forth or manually moving the drawn figures; it has to do with the relationship between continuous and discontinuous and with the perceptive thresholds of the human eye.

Already in the nineteenth century, studies on human visual perception[64] revealed that the human eye can be deceived about movement: by showing in rapid succession some static images that take different moments of the same movement a subject will see a continuous more or less fluid movement instead of a succession of discrete units. This effect was first attributed to a sort of permanence of the images

58 Cf. A. Pinotti, A. Somaini, *Cultura visuale*, cit., p. 142.

59 Cf. E. Huhtamo, *Elements of Screenology*, in J. Schröter, T. Thielmann (eds.), «Navigationen», *Display I–Analog*, 6 (2006), pp. 31-64: 35-36.

60 Cf. A. Pinotti, A. Somaini, *Cultura visuale*, cit., p. 142 and F.A. Kittler, *Optical Media*, cit., p. 99.

61 Cf. E. Huhtamo, *Elements of Screenology*, cit., p. 36.

62 Cf. *ibid*.

63 Cf. *ibid*., p. 48.

64 For example, studies on the illusion of the cartwheel, that is, the phenomenon for which we see a fast-moving object still or rotating inversely.

on the retina, then it was understood that the mechanism occurres at a higher level, that of the brain, which tended to "fill" the empty spaces between an image and the other. The time rate under which our brain is incapable to do so is around 12 frame per second (fps).

Based on these discoveries, in 1877 the science teacher and photographer Charles-Émile Reynaud created and patented the Praxinoscope, a machine able to slide and project (with a mechanism similar to that of the *laterna magica*) on a small screen a series of drawn miniatures, which thus produced an animated show. This is, in principle, a digital technology, even if not in the sense in which we are accustomed to understand this term. With "digital" here we mean a way of representing the real in *discrete* units, unlike the continuous analog. What we mainly mean today with digital, as we have already seen in the case of photography, is not only discrete, but also electronic, mathematical, binary and algorithmic.

The idea behind the Kinetoscope was to adapt this functional principle to the reproduction of images captured from reality. This was made possible by the chronophotographic gun – the first portable motion picture camera –, which allowed to capture images on film at a speed between 30 and 40 fps[65]. The kinetoscope was the apparatus for reproducing these footages: it was a large box on the top of which there was an eyepiece; the spectator rested his eye on it, turned the crank, and could watch the film mounted in the machine on spools. As a kind of fruition it was explicitly referred to the peep show[66], even though it was a radically innovative technology, namely an analog/digital hybrid (the chemical impression technique on the film was analog and the device was mechanical, but based on the succession of discrete units). A feature – long foreclosed to the cinema – of the Kinetoscope, guaranteed by its individual use, was the ability to show sound films: through a small tube to approach directly to the ear, a synchronized audio track reproduced by a phonograph (another Edison's invention dating back a little more than a decade earlier) could be heard.

As amazing as it could be, the Kinetoscope did not produce a shock comparable to that of the Lumière brothers' cinema, probably due to a phenomenon of skeuomorphism: as already mentioned, the new technology was produced in a form that explicitly recalled the peep show. In any case, with the *laterna magica* and the Praxinoscope on one side and the Kinetoscope on the other, the technical *a priori* necessary to the birth of the Cinematograph was completely available.

The famous story according to which the first spectators of a film by the Lumière were frightened by believing that the filmed train could reach them, today makes us smile. But, once again, we must think that we are talking about individuals whose gaze was different from ours: for the first time, in 1895, a two-dimensional screen becomes the threshold that allows the reproduction of a fragment of reality in motion.

The change in the scopic regime due to the cinema is perhaps the first real perceptual revolution caused by a screen. Of course, to produce it was actually the

65 The standard of the first cinematographs, was 16 fps, and then, after various experiments, passed, in the classic cinema, to 24 fps.

66 The aforementioned peep show was a box inside which objects or drawings were contained and the spectators, through a small hole, could spy on these scenes enlarged by a magnifying glass.

technological apparatus as a whole, but the interface that allows deception and access to the film universe is precisely the screen. The second revolution is that of the television screen, but before we talk about it, we have to do some archaeology here too.

Up to here I have deconstructed the genealogy of visual and entertainment media through a markedly techno-deterministic and techno-materialist approach, but I had promised to "mitigate" it with a culturological nuance. Regarding the genesis of the television screen, in fact, it is appropriate to consider two different elements and to recognize the cultural conditioning that accompanied the technological ones. On the one hand, in fact, we need to talk about a series of devices that have little to do with television technology, but which explain the progressive spread of domestic visual entertainments. On the other, we need to investigate the birth of cathode ray tube (CRT) screens and electronic technologies.

3.3.4. Domestic fruition.

If we go back for a moment to the fire screens, we will remember to have already mentioned the fact that they were often decorated. In Victorian times, over the folding screens, pieces of prints were often glued, thus becoming «celebrations of the enormous changes taking place within the "regime of the visible". The fields of unrelated and overlapping images that covered these screens were an expression of a new visual culture in the making»[67].

If, however, the decorations of the fire screens had a function closer to that of the wallpaper than an entertainment function, the lithophanes represent an important medium for the history of the domestic fruition of images. The lithophanies were porcelain plates inserted in wooden frames that, if backlit, revealed images «in remarkable three-dimensional detail»[68]. According to Huhtamo they also introduce the principle of distinction between hardware and software: «[i]nstead of displaying one permanent view, the images could be easily changed» and «[b]efore they could be enjoyed, they had to be "switched on" by lighting a candle behind them»[69].

Even the peep show can be considered, in terms of cultural forms, a precursor of the small screen, but, as mentioned previously, its use was mostly collective. Around 1750, however, a sort of peep show without a box, called Zograscope, was introduced into high-class homes. It was a assemblage of a round magnifying lens and an adjustable square mirror behind it, fixed on a vertical table. It was basically a device to enlarge and improve the perspective effect of the so-called "*Vues d'Optique*" simultaneously lengthening the physical distance from the print (placed flat on the table behind the device) and shortening it optically.

The Zograscope did not have the same success as the peep show, which continued to be preferred by virtue of its greater immersivity, yet it too can be considered responsible for a change in the scopic regime that anticipates that produced by stereoscopy, since it acts physiologically on the viewer making her perceive the print as an illusory three-dimensional environment.

67 *Ibid*., p. 43.
68 *Ibid*., p. 44.
69 *Ibid*., p. 45.

However, it is precisely the stereoscope that refines and enhances this effect. This device seems a real forerunner of the VR viewers[70]: first the two images (which, thanks to the optical lens play, overlapped and created a 3-D environment in the user's mind) were placed in a box, while the pair of lenses was mounted on the front side; subsequently, portable hoods for vision were produced. Despite these devices seem to encourage solitary immersion, often the vision of stereoscopy was a social event, even if household.

In this genealogy of the domestic use of images we have seen how often the emphasis is placed on immersivity. Yet we have also noted how these vision devices generate real social or collective rituals. Are the two things in contradiction? Probably not, since, as we have already seen talking about the magic lantern and the cinema, a collective immersion is not only possible, but also widespread. By slightly softening the rigid techno-determinism previously adopted, we can also agree with Huhtamo in saying that an immersive technological architecture is not enough to determine the actual immersion. However, we cannot deny that a device specifically designed with the criteria of immersivity tends to capture attention; moreover, although these technologies do not oblige, they certainly prepare and predispose to immersivity and obviously make it possible.

If we have now understood how a series of optical media have prepared the cultural terrain for domestic vision and immersion, now we have only to investigate the technological genesis of the television screen, wich is the history of the CRT. Its prehistory, therefore, is rooted between military technologies and information technology and oscillates between the visualization and storage of information.

3.3.5. Cathode Ray Tube.

In principle a CRT is a vacuum tube, that is a device derived from the thermionic valve (or heated cathode lamp) which is at the origin of every current *electronic* – both analog and digital – technology: it allows to control electric current between electrodes in an evacuated container, and therefore to modulate it and to sample it in *discrete* pulses. Initially, the first CRTs were used as oscilloscopes, i.e. instruments for displaying on a two-dimensional graph, the trend in the time domain of electrical signals and carrying out measurements with direct reading. Once the visual potential of the CRT screen became clear, it began to be used as a radar interface in the military, but it was not long before it found an application in the entertainment technologies: the first cathode ray tube televisions were produced by Telefunken in Germany as early as 1934. Before proceeding to an analysis of the television screen, however, I will talk about the Williams tube, a model of CRT successor of the Braun tube (the first CRT to have an application outside the laboratories), developed immediately after the World War II. I will do this for three reasons: first of all because the mass diffusion of television will take place only in the post-war period; then because the Williams tube shows very well the already digital nature of this medium; finally for the importance it will have in the history and in the conceptualization of visual HCI.

Originally designed as a function of radar technology, Williams tube (a type of

70 The stereoscope presented a problem that VR viewers try, with more or less success, to solve: it «emphasized the depth axis without managing to expand the visual space laterally» (*ibid.*, p. 55).

cathode ray tube) was the first example of Random Access Memory. Inventors Freddie Williams and Tom Kilburn patented this device in Great Britain and USA between 1946 and 1949 and it found application first in the Small-Scale Experimental Machine (SSEM – the so called "Manchester Baby") and then in numerous other digital computers like the Whirlwind I. Williams tube was used to replace the delay mercury lines[71] previously used as short-term memories, since the latter presented some disadvantages, such as the fact that «a bit or word stored in a delay mercury line is not accessible until it travels to the end of the line»[72].

In the Williams tube the impulse corresponding to the information to be temporarily stored actuates an electron gun which thus fires an electron beam, which is deflected by two plates towards a certain point of the screen which constitutes the tube terminal. The screen is covered with a phosphorescent substance that maintains a certain afterglow at the point where it has been hit by the electron beam. The light spot therefore represents a 1 in the binary code and, once it has been stored, the electron beam is interrupted, the deflecting plates are displaced and another electron beam is fired (or not) to determine the next value. These interruptions and these switch of deflecting plates are what makes this a digital technology, as it has to do with discrete and discontinuous pulses. The bright spots on the screen were then detected by a wire mesh that covered the face of the Williams tube and they were reconverted into data ready to be reused by the computer[73]. The main advantage of these CRTs was that they arranged the data along immediately accessible spatial coordinates, rather than making them temporally occur. In fact, if a delay mercury line was able to store less than a thousand bits, each Williams tube could store about 1024 to 2560.

When we talk about Williams tube we are talking about a screen, an optical technology, which, however, is not initially designed or used to display images. It is an *intraface*, a computer-computer interface, which will however have a tremendous impact on visual culture, both for the subsequent use of CRT screens and because it is the first example of graphical representation of bits of data. In Claus Pias' words:

> What is crucial about the Williams tube was that it created a new form of visibility or image processing, in the literal sense of the term. Its method of processing data did not merely result in the visualization of something invisible or absent; it is rather the case that the dot-images themselves *were* the data of the memory device. They were indexical rather than representative[74].

71 The mercury delay line was basically a tube filled of mercury. «At the one end of the tube, a quartz crystal would convert electrical pulses into sound waves, which would travel at a specific speed toward the other end, where they could be detected by another crystal and returned in an amplified form to the front of the delay line» (C. Pias, *Computer Game Worlds*, tr. V.A. Pakis, Diaphanes, Zurich-Berlin 2017, p. 77). The amount of information kept running through the delay line until the gate that would have brought it back (in electrical form) to the computer for reuse was reopened. An interesting element is that the very first computer memory was therefore a sonic device.

72 A.W. Burks, *Editor's Introduction*, in J. von Neumann, *Theory of Self-Reproducing Automata*, ed. A.W. Burks, University of Illinois Press, Urbana 1966, pp. 1-28: 12. Quoted in C. Pias, *Computer Game Worlds*, cit., p. 78.

73 Cf. *ibid.*, p. 79.

74 *Ibid.*, p. 78.

Until now we have talked about the interface in the most classic terms and related to its etymological sense of what «operate[s] *between* the indexical relationship of data and display», of what «denote[s] everything that data processing simultaneously makes invisible and, in another manner, allows to *reappear*»; but, in this case, «an interface would also be that which generates data out of inputs with the effect that the inputs no longer *are* the data»[75].

We have therefore seen how the CRT is a digital technology and how its screen does not represent, but actually shows the digits. So why do we often refer to CRT television as "analog television"? Because – as in the case of cinema, even if in a different way – we are dealing with a hybrid analog/digital medium.

The construction of an image on a CRT screen takes place with the following process: an electric signal activates the electron gun which fires the electron beam at an extreme point of the screen and, starting from that, draws a line; the signal, however, has variably modulated intensity and the brightness of the line is not homogeneous; once the line is drawn in full, the electron beam will stop, the electron gun will reposition itself at the starting point, but in order to shoot a new beam just lower, so as to start drawing a new line; and than again and again. The modulation of the light intensity corresponds to the light conditions detected by the recording instrument and then, at the end, the set of lines will reproduce the recorded image. Obviously all this process happens at a high speed, so that it is imperceptible to the human eye and that, once the first line drawn is losing brightness, the electron gun is already overwriting a new line[76]. Basically each line is drawn with an analogical procedure (continuously modulated signal), but the switch between one and the other, regulated by a relay, is a digital technology. Moreover each line constitutes a frame and, therefore, a digital unit that composes the image.

This mechanism brings the visual illusion to a new level. The impression of movement is generated by a succession of frames as in the case of cinema, but there is no possibility of identifying individual static images: in fact, each line reproduces a shooting that took place at a different moment from all the others[77], but also, having this line a verse of writing, each of its points belongs to a previous instant with respect to the next point. On the one hand, therefore, the movement is an illusion produced by the succession of frames (the lines), on the other, however, the television image actually reproduces a continuous flow, since each of its points reproduces, within the same screen, an instant different from the others. It is therefore not just a spatial illusion produced by a precise temporal succession at a

75 Cf. *ibid.*, p. 71.

76 This is the description of a black and white screen: with regard to the color screen we must add that there are three types of phosphors (green, red, and blue) arranged in parallel strips or groups of points, behind which there is a separation mask; then there are three cathodes that shoot as many beams of electrons that illuminate and regulate the intensity of each color for each strip.

77 This, in part, is also true of photography: the shutter of a camera, in fact, moves from right to left or from top to bottom, impressing the film in the same direction (and then in certain portions before than in others) and not all together; however, in that case, the single "line" is fully impressed at the same time.

given speed, but rather it is a complex time-critical process[78].

All of this obviously needed a new recording medium that would allow it: the video camera. It consists of a lens, a sensor and an image processor, with the addition of a magnetic or optical recorder that allows to record and possibly send the signal. This tool also allows the release of live broadcasts that permit to see through the screen events that, at the same time, are happening elsewhere; this is because conversion into an electrical signal means that the latter can be sent immediately and at a speed close to that of light.

The television screen thus becomes a disruptive novelty for several reasons: with its reduced size it determines a new scopic regime, training the user to a different kind of vision, closer and more intimate (even when in company); thanks to the proximity and integration in the home environment (as a piece of furniture) it creates a new immersion given by the familiarity and the capture of attention through the combined effect of images and sound, rather than by some optical effect; it changes the way we relate to the transmission both for the supply of images on demand, and for the possibility of obtaining live images.

We must keep in mind, however, that the television screen did not appear at its beginning, already in the classic rectangular shape with rounded edges, as we are used to remember them in childhood memories or in the reminiscences of some old film. Originally, for eminently technical reasons, it was small and round; subsequently, for cultural reasons, when technology allowed it, they assumed the rectangular shape.

Initially, CRT (electronic) televisions were competing with mechanical (and therefore entirely analog) televisions based on Nipkow disk technology[79]. The mechanical televisions were radios with the addition of a television device, consisting of a neon tube behind a rotating mechanical disk (Nipkow disk) that ran in front of the sensitive elements of selenium, and instant after instant an electrical value was obtained, corresponded to the brightness of a point in the image, line by line. The principle was similar to that of the CRT, but the writing through lines and interruptions was obtained thanks to the spiral holes made on the disk and to the continuous rotation of the latter. The shape of the screen obviously depended on that of the disk. But even the first CRTs were round and «[m]anufacturing large cathode ray tubes was difficult, which partially explains the small size of the screens in early electronic TV sets»[80].

Despite the complex system of visual illusion mentioned before, made by the CRT television, we can confirm that it maintains an indexical relationship with reality: at least with the reality of the signal, whose variable intensity directly causes the phosphor lighting on the screen, which is directly proportional to it. In

78 With *time-critical* we mean a process in which perfect synchronization is crucial to the success of the medium's operation. In the case of the CRT, it may be said that it is more a *time-based* medium, since synchronization is necessary for the success of the human αἴσθησις and not for the machine process itself, as it may be for a computer (cf. W. Ernst, *Medienwissen(schaft) zeitkritisch*, cit., pp. 19-20); however, since I am considering this medium already in its television stage, and therefore aimed almost exclusively at human perception, I would like to extend the use of the term.

79 Cf. E. Huhtamo, *Elements of Screenology*, cit., p. 61.

80 *Ibid*.

some of the first models, however, an additional level of mediation was introduced: the cathode tubes were built vertically and in order to display the screen (indirectly), a lid containing a mirror was to be lifted and placed obliquely.

Very soon – even before it was possible to produce flat CRTs – the edges of the tubes began to be masked, trying to give the screen a square shape. This is due to the relationship of television with the film medium:

> Television could not compete with the size of the screen, but making it square could be read as a symbolic challenge. There is also a more concrete explanation: showing old movie serials and Hollywood films became an important part of the TV programming, forcing the TV manufacturers to simulate the ratio of the cinema screen[81].

Progressively, viewers also began to move away from the screen, especially after the invention of the remote control, and the use of television took those cultural characteristics that, to a large extent, remain to this day[82].

But we must not forget that CRT screens were also the first screens of personal computers. As we have seen, their first use in computer science was that of memory devices and the display of data on them was neither intended for viewing nor responding to graphical canons. However, the possibility that CRTs offered to literally draw an image on a screen by programming the modulation of the electrical pulse that served as input did not go unnoticed. With the mediation of a digital-to-analog converter – which translated the impulses coming from the computer hardware into continuous variable intensity electron beams –, the computer graphics was born, with all the consequences on the ontology of the image we will have speak later.

The introduction of the screen as a human-computer interface had enormous consequences on the relationship with the machine and its possibilities of use, no longer reserved for engineers and computer scientists. The user regains a close-up view of the screen, which establishes an interactive connection with the computer, and definitively affirms the distinction between hardware and software.

The computer as a universal Turing machine can carry out virtually any operation and the instructions supplied to it represent the software; these instructions, however, ultimately concern the hardware and operations that its circuits incorporated in silicon will have to perform. Through the mediation of a visual interface allowed by the screen, the instructions and even the entire programming process can be carried out by sending input without ever touching the hardware. With the introduction of the sketchpad (in 1963) it becomes even possible to draw circuits that are immediately displayed and, simultaneously, simulated: «machines designed in this way were already operational in a virtual manner. Design became indistinguishable from simulation»[83].

It is also possible to state with a good dose of certainty that without a screen interface we would not even have internet, or at least not with the characteristics with which we know it today (the world wide web)[84], with all the consequences it

81 *Ibid*., p. 64.

82 Cf. *ibid*., pp. 62-63.

83 C. Pias, *Computer Game Worlds*, cit., p. 94.

84 ARPANET, the ancestor of the internet, was developed in 1969, the first screen interfaces four

has had on perception, cognition and action, also through its visualization modalities.

It can be said that the CRT screen has been one of the most disruptive and epoch-making technologies ever: they have characterized and partly directed the development of television and computers, not only from the technical point of view, but even from that of the content (starting from the possibility of live broadcasting to get to software programming and the internet). An optical technology, produced not for aesthetic needs, but for reasons of scientific measurements and military applications, has become one of the most influential vehicles for the diffusion and production of images of the history of visual culture. Our contemporary screen culture, the era in which screens are omnipresent, mobile, interactive, intuitive, always on, is almost entirely due to the invention of the cathode ray tube.

Nevertheless, the CRT screen has now almost completely disappeared. It has inherited a cultural form that seems far from being outdated, but, from a technical point of view, has now been supplanted by digital screens.

3.3.6. Digital screens.

From the hybrid analog/digital images to an entirely digital optical technology: the digital screen is entirely composed of discrete units in three colors and with adjustable brightness, whose lighting is determined by discrete quantities of binary information, coded and stored in memory units[85].

Compared to analogue television, the images that appear on the digital screens have one more coding layer: the mathematical one. This codification process has already been described when I talked about digital photography, but I will briefly summarize it, referring directly to a type of transmission such as television broadcast: the light measurement obtained through an optical apparatus is translated into electrical impulses, which, instead of being sent directly to a receiving apparatus, are encoded as data written in binary mathematical terms and only subsequently sent; the receiving device recognizes the signal in binary terms and therefore receives the information, which is then decoded so as to be displayed in a visual form. This also affect the temporality of the digital transmission and image processing: if the CRT technology had introduced live transmission, the complete digitization gives rise to *real time*. Real time is a non-instantaneous transmission and, however fast, intrinsically delayed, since it is a process of constant micro-archiving and re-presentification of the data collected and transmitted. The present in real time doesn't exist: the transmission is in fact already outdated and contains both the redundancy of what preceded it, as well as an anticipation of what will happen after, in a mechanism of retention and protention technically (re)produced. All this prepares for a new relationship with

years earlier, in 1965.

85 Although the operating principle is identical, there are some technical differences between LCD, LED and OLED screens, which affect the quality of the image. LCD and LED screens are made of cells in which the phosphorescent elements are liquid crystals. In the first case they are backlit by fluorescent lamps, in the second, as the name implies, by LEDs. As for the OLEDs, however, the thing changes: there is no phosphorescent element, but the pixels themselves are colored and have an independent lighting; this allows for reduced energy consumption, deeper blacks (because pixels can switch off completely and become black) and thinner screens.

the technologically reproduced present, but this relationship has not yet been metabolized and generates temporal irritations[86].

The display on a digital screen has a different relationship with the space and time compared to that on CRT screen: each pixel is time-and-space-discrete, but at each instant each pixel that forms the overall frame simultaneously represents the same instant. In this sense, the display on digital screens has a more similar logic to that of the cinema, although the frame is not a single image impressed in an analogical way, but instead consists of additional micro-frames (pixels) activated electronically.

In the case of computer graphics interfaces, however, we must recognize that in reality there is one coding layer *less*. This is because the graphic elements of the visual HCI do not have a first real source, but are the direct result of code programming. When I program a graphic element, I'm telling the computer how it should behave in order to light a certain pixel in a certain way on the screen. I am programming according to the screen, or, in a sense, I am programming the screen. The indexical relationship that, on the basis of Pias, we had already identified when speaking of CRT screens becomes here even more evident. The apparent paradox lies in the fact that it is an indexical relationship not with an external reality, but with data, and therefore with a techno-mathematical reality, which is configured as calculating and calculated *matter*; however, there is no paradox, since the reality of the computer, its ontological specificity, *is* techno-mathematical.

This "revolution" in design of digital screens and their mutated relationship with the images they can represent gave rise to different interpretations: Francesco Casetti, for instance, affirms the transparency of the screen, the end of the visible/invisible, or surface/structure dialectic, as the digital screen shows, makes available, makes accessible, and exhibits, rather than "discovering"[87]; Carbone, for his part, does not agree and remembers how the digital screen is based on the logic of the cut and on how it "demands" the gaze, establishing a particular "regime of light"[88]. But the point is another: the digital screen actively participates in the production of the image. It is the last link in a chain of translations that serves to make visible a portion of information: Casetti is right in saying that the screen shows information, but, at the same time, Carbone is right in affirming an active role of the screen itself. What the screen still "conceals" is the complex selection and production process, of which it is also a part.

By combining the idea of the indexical relationship with the affirmation of the techno-mathematical nature of the computer medium, we must conclude that *the digital image does not exist*, or at least does not exist *as an image* before its *phenomenological* appearance on the screen. Or rather, the image *is also* organized matter, since its phenomenological appearance is detereminated by the logic of such organized matter.

Already for Flusser the technical images (even before the digital ones,

86 Cf. W. Ernst, *The Deleyed Present: Media-Induced Tempor(e)alities & Techno-traumatic Irritations of "the Contemporary"*, Sternberg Press, Berlin 2017, in particular pp. 11-24.

87 Cf. F. Casetti, *La galassia Lumiére. Sette parole chiave per il cinema che viene*, Bompiani, Milano 2015, p. 261.

88 Cf. M. Carbone, *Filosofia-schermi*, cit., p. 131.

including therefore the analogical photography in his speech) are conceptual images, indirect consequence of the scientific texts that produced the apparatus[89]. But despite their conceptual nature, or perhaps precisely because of this, technical images have a direct relationship with the reality that causes them, «since their significance is automatically reflected on their surface – just like fingerprints, where the significance (the finger) is the cause and the image (the copy) is the consequence»[90]. Following the same logic, the significance of a digital image is reflected directly on the screen, since the data are the cause and the images are the consequences, namely information, i.e. data "in action".

Following Frieder Nake's theory, we will say that the digital image does not have a visual, but an algorithmic nature. The visual surface is caused by a mathematical and operational *subface*[91]. We therefore have a *visual phenomenological* appearance determined by a *techno-logocentric* ontology[92]. This, far from determining a prevalence or a priority of λόγος on εἰκών, once again underlines its co-origination, concomitance and co-application (log.*icon*): a λόγος determines εἰκών, but this *language* is written with the precise purpose of causing an εἰκών (in a sense, the image is literally "written"[93]). Moreover, by virtue of the above-mentioned indexical relationship, the λόγος *is*, in a sense, the εἰκών[94].

In this sense, the digital screen further refines the illusion mechanism generated by the interfaces: on the screen *there are* the data or the information, but they *appear* to us as images or graphic elements. This time the interface does not deceive by concealing, but showing; it shows, however, in a form suitable for human perception, that is visual, something that for the computer has nothing visual.

This availability of data and options displayed in real time favors forms of interactivity that make the user believe he has an active role in the operations of the machine[95].

89 «Ontologically, traditional images signify phenomena whereas technical images signify concepts» (V. Flusser, *Towards a Philosophy of Photography*, cit., p. 14). See also Id., *Into the Universe of Technical Images*, cit. Please note that with "apparatus" the German *Apparat* is translated, in the sense of "device".

90 Id., *Towards a Philosophy of Photography*, cit., p. 14.

91 Cf. F. Nake, *The Disappearing Masterpiece*, cit., p. 13.

92 By "techno-logocentrism" I mean the centrality of the logical-mathematical-linguistic dimension in the computer world, governed by the code. This is not always explicit language, but the logical dimension is always called into question, even in the structure of the hardware that allows the coding of the signal. The reality of the computer is techno-mathematical not because the technical and mathematical elements are added together, but because they are co-present in the logic of the circuits. If the analog media directly impress the real on material supports, digital media instead pass for a symbolization. However what should be noted is that for the computer the code is the real.

93 Note that, in the Byzantine era, the Greek verb γράφειν was used both to indicate the action of writing and to produce icons (cf. G. Lingua, *L'icona, l'idolo e la guerra delle immagini*, Medusa, Milano 2006, p. 114). A co-participation of the regimes of the logical and the iconic, rediscovered in the digital world, had already been intuited in some cultures throughout history.

94 For a more extensive definition of the concept of log.*icon*, see *supra*, p. 87.

95 Someone could link the interactivity and the impression of an active role to the role of haptic interfaces (such as the mouse or the keyboard) or the integration of the haptic dimension itself in the screen (touchscreen). This may be partially true, but two clarifications have to be made. The first is that haptic interfaces develop as a consequence of visual ones. Those that according to Campanelli (cf. V. Campanelli, *Web Aesthetics*, cit., p. 135) are mainly tactile experiences, such as

The fruition of the contents mediated by the screen changes in relation to different aspects. First of all, the relationship with temporality is modified: the discrete nature of digital events allows a transition from one image to another, from one display to another in a very quick access time and makes available at the same time, and almost hypertextual, distant temporal events; however, if glitches or errors occur, the temporal irritation is even amplified. Regarding spatiality, the greater detail and the stability offered by the digital image avoid those visual irritations caused by the constant flow of drawing, as well as by the static electricity that accumulates on the surface of the CRT screens; nevertheless the illusion of perfect reproduction of the continuous reality can be disturbed when, by magnifying a digital image, the outlines formed by pixels are noted.

Differences in the perceptive level between CRT and digital screens therefore exist, but, as I said before, in terms of cultural forms and scopic regime, not much has changed: it has simply been perfected by digital screens. Also the conditioning effect of the interface is amplified and this is due mainly to the impression of immediacy.

With impression of immediacy I mean the perception that a mediated content (mediated by a codification and a subsequent visualization) is treated as if it was a not-mediated access to reality itself. In this case it is a matter of confusing the appearance (visual) with reality (which is instead techno-mathematical), considering therefore that direct access to the contents of the machine is possible, bypassing the material support constituted by the screen and the rest of the hardware. The fact that, although having to do with a medium, we pay little attention to the function of mediation and focus exclusively on the content, is the effect of the deceptive function of the interface and is what I call "decline in hermeneutical attention".

Also in the case of digital screens immersivity plays an important role and further it favors the impression of immediacy. It is interesting to note, moreover, how the computer screen, thanks to its ability to capture the attention, maintain for

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the use of a keyboard or a mouse, are actually mixed experiences (optical-tactile, oculo-manual), but carried out according to the interaction with the visual element: the keyboard allows to display a text, the mouse allows navigation in a visual environment mediated by the optical support; the touchscreen, then, represents the illusion of being able to directly manipulate the optical support. The second is that the tactile dimension is not typical of digital screens alone. With proto-interactive television (we are talking about, for example, *Winky Dink and You*, a program broadcast since 1953), which required to apply transparent sheets on the screen to draw on it, an «idea of close, tactile personal relationship with the screen» is already inaugurated (E. Huhtamo, *Elements of Screenology*, cit., p. 63). Moreover, since the late '50s, SAGE radars were equipped with light gun, a device that allowed to interact directly with the CRT screen (cf. C. Pias, *Computer Game Worlds*, cit., pp. 81-84) and which would then be reused for different uses up to video-gaming. There is, however, a technical difference between the CRT screen-light gun interaction on one side and the finger-touchscreen interaction on the other. A light gun is, fundamentally, an optical device for receiving light rays coming from the CRT screen; when a switch is pressed, the reception is interrupted and the light gun sends an input to the screen to indicate where the interruption occurred (for this reason the position of the light gun must be calibrated before starting to use it). A capacitive touch screen (the type of touch screen used for smartphones), on the other hand, works by passing a flow of electrons on the screen surface; when a finger (or another conductive object) touches it, the flow is distorted making it possible to locate the exact point that has been touched.

the moment a greater degree of immersion compared to devices for virtual reality or augmented reality. This is probably due to the fact that VR viewers or devices such as Google Glasses are still considered foreign bodies whose presence is apperceptible during the use. On the contrary, the computer screen (and even more the screens of tablets or mobile phones[96]) is identified with the computer itself, or rather with the virtual environment to which it opens. The impression is that of not being in front of a screen that displays a virtual environment, but that of being in front of the virtual environment itself; this is favored by the progressive reduction or cancellation of the frames surrounding the screens, on televisions as well as on computers or smartphones.

These screens that become imperceptible thresholds, not only open us a world, but allow us to inhabit it: they promise us a *reversibility*, a possibility of passing through them. This reversibility was intended by Mauro Carbone as the unveiling of the screen as a "quasi-subject", which transforms us users into "quasi-images" to its gaze[97]. The suffix "quasi-" is necessary since such reversibility is always promised, although never fully implemented. And this is precisely what binds us to our screens, what *seduces* us, what generates immersivity. But this mechanism of *seduction* has to do with the ways in which the screens affect our perception, and I will write about this in the next section.

4. Rehabilitating aesthetics.

In the first sections of this chapter we have seen how an aesthetic based on the prejudices of aesthetic consciousness, of the difference between λόγος and εἰκών, and of the distinction between the real world and the virtual world, is not able to adequately explain the conditioning power of the interfaces. For this reason I have undertaken an archaeological and technical analysis to identify the origins of this power in the structures of the apparatuses, in their functioning and in the cultural techniques that accompany them.

Now that we have identified the *causes*, we can admit that there is room for a specific discipline to study its *modes*. This discipline can be aesthetics, provided that we are talking about a rational or perceptual aesthetic.

4.1. Rational aesthetics.

First of all, different problems or issues that we have posed can be answered in the context of an *empirical aesthetic*, in the sense of experimental aesthetics[98]. This type of function is today carried out by specialized disciplines, such as perceptology or psychology, but it could be useful for advancing screen studies, media studies, and philosophy itself to find a unity among these sciences that puts them in relation to technical ontology and to its effects on human beings. Experimental aesthetics could guarantee this unity. For example, one of the themes that this type of aesthetics could develop would be to clarify how the homogeneous visual appearance generated by illuminated pixels – which have a non-visual and non-

96 In fact, one of the most successful augmented reality experiments was *Pokémon Go* – which is actually supported by mobile phones – and not, for example, Google Glasses.

97 Cf. M. Carbone, *Filosofia-schermi*, cit., p. 128.

98 Cf. M. Ferraris, *Estetica razionale*, Cortina, Milano 1997, p. 15.

homogeneous nature, but are electric, informational and discrete – works.

However, empirical aesthetics requires a, we could say, transcendental foundation: it requires a *rational aesthetic*. To this expression Ferraris attributes three meanings: the first is that of a "reasonable" aesthetic; the second is, precisely, that of a non-empirical aesthetic (to which empirical aesthetics necessarily follows); the third is that of aesthetics as a theory of reason[99].

To re-propose an aesthetic that presents such characteristics, it will be necessary to go back to the one who coined the term and introduced it into philosophy: Alexander Gottlieb Baumgarten. Aesthetics is understood by its founder not as a theory of beauty, nor a philosophical study of art or of the image in general. Rather it is science that has as its object the αἴσθησις, that studies the way in which *sensations* can become knowable to "the soul"[100]. In this sense aesthetics is *gnoseologia inferior* (inferior gnoseology) and *ars analogi rationis* (art of the analogue of reason)[101].

A rational aesthetic thus conceived is both the theory of knowledge and the theory of reason. As far as reason is concerned, aesthetics has to do with the propedeutic mechanisms to knowledge proper – that is the collection of sensitive data that "activate" the a priori forms of the intellect[102]. With regard to knowledge one can say that aesthetics concerns the first level of knowledge, namely that of the senses and their truth value. However, note that the truth of the senses is something different from the logical truth, not so much because it is a different concept of truth, but because of the diversity of the object to which it refers.

Suppose that I find myself on an airplane that is about to land in Berlin and that I see a bright patch in the middle of a green field, which should be caused by the reflection of the sun on a body of water; once the airplane has lost further altitude the reflection will become less intense and I will also be able to distinguish the typical boomerang-like contours of the Krumme Lanke. This second perception and the association of it with my previous knowledge – which allowed me to formulate the judgment "the airplane is now above the Krumme Lanke" –, do not falsify at all the first perception[103] of the sun reflection on a body of water in the green field, which therefore continues to have a positive (even if not logical) truth value if referred to the senses. The difference, to use Leibnizian terms, can lie in the fact that the former is a *clear and confused* perception, while the latter is *clear and distinct*[104]. In this sense, and only in this, as Nietzsche had to say, «the senses [...] do not lie», insofar they «display becoming, passing away, and change»[105].

To be sure that such a concept of aesthetics can really be proposed as a foundation for an experimental aesthetic suitable to study the relationships

99 Cf. *ibid.*, p. 15-16.

100Cf. *ibid.*, p. 44.

101A.G. Baumgarten, *Aesthetica*, Kleyb, Frankfurt an der Oder 1758, I, § 1.

102In the rationalism of the Leibnizian tradition – to which Baumgarten belongs –, unlike in the Cartesian one, experience plays a fundamental role. Cf. M. Ferraris, *Estetica razionale*, cit., p. 47.

103Cf. *ibid.*, p. 39.

104Only of clear and distinct perceptions can be said if they are adequate or inadequate, that is, can be assigned to them a *logical* truth value.

105F.W. Nietzsche, *Twilight of the Idols. Or, How to Philosophize with the Hammer*, tr. R. Polt, Hackett, Indianapolis-Cambridge 1997, p. 19.

between visual interfaces and perception, we must however verify whether it is able to avoid the difficulties in which the theory of aesthetic consciousness fell, that is if it can avoid (I), (II), and (III).

As you have probably already understood, Baumgarten's aesthetics can easily avoid (I). This is because, with the emphasis on co-origination and cooperation between aesthetics and logic (both conceived as forms of knowledge), already in the act of perception[106], it makes no sense to place λόγος and εἰκών in distinct realms[107].

Regarding (II), we have to underline once again the influence of Leibniz on Baumgarten. The rehabilitation of Aristotelian and scholastic metaphysics operated by Leibniz means that virtuality is never conceived in terms of transcendence, but rather of potentiality already concretely present in the world, waiting only to become actuality. Even wanting to defend the existence of innate Platonic ideas, Leibniz and his followers describe them as an *a priori* that remain latent «until a sensation awakens him»[108].

Finally, (III) is avoided by definition, this being exactly the pre-Kantian approach, which does not refer to an aesthetic consciousness, but to the modes of perception.

In addition to avoiding the difficulties above mentioned, Baumgarten's aesthetic is far from the aesthetics of images. This is because he does not speak of works, objects, or images, but of *conditions of vision*[109]. It is therefore understood that such a conception of rational aesthetics is perfectly compatible with the theory of scopic regimes and can be used to understand how vision techniques or optical technologies can change the conditions of perception.

Furthermore, rational aesthetics deals with the way in which perceptions are inscribed in the soul; it can therefore also be interested in the way in which they are inscribed on material supports, or how such supports act as means to inscribe certain perceptions in the soul. In short, only rational aesthetics can be aesthetics of mediation.

We can therefore assume that on the basis of rational aesthetics the aesthetics of technical and technological supports can be founded, which can take the form of what Simondon called *techno-aesthetics*.

4.2. Techno-aesthetics.

Simondon tells us that technology and aesthetics are not contradictory realms, since a technical object can arouse aesthetic impression, and it can do it precisely because of its technicality. This position makes sense only if we mean aesthetics as a philosophical discipline dedicated to the study of αἴσθησις, then exactly in the sense of rational aesthetics described in the previous section.

106Cf. M. Ferraris, *Estetica razionale*, cit., p. 20. According to Ferraris, this cooperation takes place in *retention*. In phenomenology, with the term "retention" we mean that process whereby a phase of a perceptual act is retained in our consciousness.

107Moreover – again in Leibnizian terms – even when it is clear, distinct and adequate, a knowledge can have something iconic, or at least be graspable through aesthetics, when it is intuitive and not symbolic.

108*Ibid.*, p. 45, my translation.

109Cf. *ibid.*, p. 48.

The sensation caused by technical objects is described as a perceptual-motor and sensory intuition[110]. Perception and intuitive knowledge are therefore called into question, just as in Baumgartenian aesthetics. This thesis, moreover, agrees with both the Leibnizian one on the conditions of vision, and with the theory of the scopic regimes that we have decided to embrace: Simondon, in fact, tells us that each technical object presents a sensory range of its own, i.e. that each technical object is able to arouse certain sensations[111].

But what exactly does the French philosopher mean by the term "techno-aesthetics" (*techno-esthétique* or *esthéto-technique*)? Mainly it is declined in three meanings: it could be the study of (1) the aesthetic pleasure aroused by technical objects; (2) the way in which technical objects condition the αἴσθησις; (3) the aesthetics of finalized gestures and behaviors.

On (1), for now, I will limit to note that Simondon states that all the technical objects have, in a certain sense, a certain aesthetic value connected to their ability to arouse a pleasure[112]. To this is connected an aspect that I will discuss later in the section.

(2) is connected to the already encountered definition of sensitivity technologies: the technical objects, understood in this case explicitly as media, are able to amplify our perceptive capacities. But this goes beyond the well-known McLuhan thesis that media are "the extensions of man". In fact, they do not only serve to enhance or sharpen the senses, but also to make perceivable things that would not be so, or that could not be in certain ways. Electricity, for example, is not an object in the proper sense, but can become the object of αἴσθησις if mediated by a technical object[113], as it could be an optical apparatus like a screen, which generates an interface. Simondon, moreover, defines the αἴσθησις as a «pre-selector that discerns the acceptable from the unacceptable and determines the action that accepts or rejects»[114]. The αἴσθησις thus understood, that is, as a field of what is not only perceived, but perceptible, is determined by the cultural forms of belonging, and also by the technical objects that are part of a material culture.

But also according to the definition of technique that we have adopted from the beginning, we must recognize that a techno-aesthetics, or aesthetics of technique, can not ignore cultural techniques. And it is in this sense that Simondon intends (3), hoping for a study of the aesthetics of those behaviors aimed at introducing a finality in the matter[115], which have not only value in the realm of utility, but also in that of the αἴσθησις and even of beauty.

This techno-aesthetics, unfortunately left by Simondon only in the draft state and as an address and hope for future research, if properly developed, could be the experimental aesthetics suitable for the study of the ways in which the visual (and not only) HCI interfaces modify our perception.

Moreover – and here I reconnect to (1) – this type of aesthetics provides a

110Cf. G. Simondon, *Réflexion sur la techno-esthétique*, in Id., *Sur la technique*, PUF, Paris 2014, pp. 379-396: 383.
111Cf. *ibid.*, p. 384.
112Cf. *ibid.*, p. 385.
113Cf. *ibid.*, p. 388.
114*Ibid.*, p. 387, my translation.
115Cf. *ibid.*, p. 392.

complementary explanation to the causes of conditioning: with our archaeological analysis we have studied how the interfaces have perfected their deceptive mechanisms; but why do not human beings resist these deceptions and, on the contrary, seem to accept them willingly? This, at least from the moment when we are dealing with optical devices for vision, can be explained by the fact that the pleasure generated by technical objects is not of a contemplative, but of a operative type: it is a matter of "functional joy"[116]. This means, trivially, that media ensnare us because we like to use them. The pleasure generated by our "screen experience" is the result of that seduction mentioned in the previous section: the perceptive-affective characteristics of this experience settle in the corporeity of the users, in their conscience, phenomenologically understood as a set of lived experiences[117].

However, dialectically, this functional joy could be just the incentive to free ourselves from superficial enchantment. Since, according to Simondon, aesthetic pleasure does not only concern the user, but also, and perhaps primarily, the producer[118], it may be that each of us can be grasped by the desire to "open the box", produce or reproduce the technical mechanisms, to practice reverse engineering. It could therefore be just an aesthetic push to make us undertake the archaeological analysis to which we were dedicated in the previous sections, giving us greater awareness about media we use.

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Through the technical media ontology we can understand the *causes* of the conditioning operated by visual interfaces on our perception; a perceptual empirical aesthetic, founded on rational aesthetics, can help us to understand *how* this conditioning takes place. But we still have to ask *why* this conditioning is put in place.

What effect does conditioning have on human action? What is the purpose of changing the user's action in the machine's logic? And what impact do the changes in action have on the individual and collective dimension?

To answer these questions it is necessary to adopt a *cybernetic* look, that is to look at the system of Human-Computer Interaction without granting any privileges to one or the other component. Only in this way will we be able to understand the function of each component and the role of interfaces as tools for regulation and feedback. And this will be the object of the next chapter.

116Cf. *ibid.*, p. 383.
117Cf. M. Carbone, *Filosofia-schermi*, cit., pp. 121-125.
118Cf. G. Simondon, *Réflexion sur la techno-esthétique*, cit., p. 384.

V. Action: Ideological Interfaces and Mediopolitics

After dealing with the issues concerning the interaction between visual interfaces and human perception, with particular attention to the tendency to immersion, a philosophy understood as mediology must deal with the theme of *action*. By this I mean that it will be the conditioning that the interfaces operate on human action that will be discussed, but not only: the term "action" must be used in the most neutral but precise sense possible: in that of "finalized behavior", so as to include both human and non-human actions and, finally, interactions within a mediatic system.

This use of the term "behavior" is perhaps closer to that of Mead than to that of Watson. It is not a question, in fact, of reducing the theory of action to the analysis of linear behaviors ranging from stimulus to response, completely neglecting private sphere or consciousness: rather, it is a question of treating the latter as behaviors too, although of an emerging and more complex nature; of considering the linear stimulus-response model as *a particular type* of behavior; of taking into account especially interactions.

Behavior has an active or interactive nature, but sometimes even passivity plays a role: what can be behavior (act) for a component of a system, can be endured (passively) by another component. However, an action endured generates or can generate a response, which translates into a behavior, which can be a merely induced behavior or the beginning of an interaction.

It is from this point of view that we need to look at *conditioning*: it is not a behavior, but a type of *learning*. However, if we want to talk about the conditioning that the machine, through the interface, exerts on the human being (creating a scopic regime, leading to immersion, etc.), we must say that "conditioning" is the way we call a *learning process*, which is an *interaction* whose extreme poles are constituted by the *behavior of the machine* (teaching or training) and by the *behavior taught or induced to the human being*. The process becomes interactive if the response behavior serves as a new input for the machine. As we shall see, training can lead to responses intended as first-degree behaviors (simple responses to certain stimuli), or to more complex emerging behaviors, which open up new possibilities of action for the human being.

For training to be effective, it is necessary, first of all, for the component that teaches to find a common plan with the one that learns, so that it can act on it and be understood by it. This is why the interface is necessary: to translate the inputs into signals perceptually comprehensible to the human component. In the previous chapter, we have seen how training begins on the perceptual level; however, it concretizes itself in the predisposition to action in the human component.

Even treating cognition as an emerging behavior, however, we must recognize that there is a missing link between perception and (predisposition to) action. A

perceptual stimulus in itself is not enough to cause an action: such a stimulus must be grasped, taken into consideration, *apperceived*. In other words, what makes a stimulus predispose to an action is the fact that the human component pays *attention* to that stimulus, includes it in its own *attentional regime*.

The issue of attentional regimes has already been mentioned in chapter III[1]. Now it can be taken up in the light of techno-aesthetics. In particular, I refer here to the meaning (2) of techno-aesthetics: the study of the way in which technical objects act on *aisthesis* and, above all, in which they act as pre-selectors of experience.

The development of this aspect of aesthetic-technical analysis will help to clarify and thematize the link between perception and attention, as well as to resume and deepen the discourse on the modes of action of visual interfaces in the field generated by the double mechanisms of alert and attention.

1. Techno-aesthetics and attention.

The techno-aesthetic approach here assumes a precise characterization: it is that approach that requires us to look at technical objects and, therefore, also at media, from a (perceptological) aesthetic point of view, but also technical and functional, without these things being in contradiction with each other. This means admitting that optical technologies that implement visual interfaces can have an aesthetic function, meaning that they act on perceptual dynamics and create and establish conditions of visibility or scopic regimes.

When it was said, in chapter III, that interfaces are cultural techniques that separate visible from invisible, audible from inaudible, touchable from untouchable, meant exactly what Simondon describes as the pre-selection mechanism of the *aisthesis*. Since the *aisthesis*, according to the techno-aesthetic investigation, is determined by cultural forms *and* material culture, we could even decree the collapse of the distinction, so far maintained, between cultural technique and technical culture: all the examples of optical technologies that we have reviewed in the previous chapter are material objects that concretely implement cultural forms.

Pre-selection is what prepares the field for conscious experience and apperception. The term "apperception" has, in psychology, many meanings that are not always superimposable: in general, it is considered a mental process, sometimes interpreted as an understanding of what had previously been experienced, sometimes as a reinterpretation of a new experience in the light of past experiences, but in general it is almost always defined as a process of systematization (sorting of the previously indistinct mass of experiences, insertion of an idea into a coherent system). However, the meaning that is used here goes back to the philosophical origins of the term, used for the first time by Descartes[2] and better characterized by Leibniz[3]. The Leibnizian meaning is usually assimilated to the modern concept of attention or to that of "conscious perception". To be more precise, we will say that by "apperception" we mean a perception that is able to

1 Cf. *supra*, pp. 84 ff.

2 Cf. R. Descartes, *Les passions de l'âme*, Vrin, Paris 1964, p. 81.

3 Cf. G.W. Leibniz, *Principes de la nature fondés en raison et de la grâce*, in Id., *Monadologie und andere metaphysische Schriften*, tr. U.J. Schneider, Felix Meiner, Hamburg 2002, pp. 152-173: 156.

direct attention and that actually enters the attentional field.

The pre-selection carried out by the *aisthesis* within the framework allowed by techniques and technologies of sensitivity prepares the field of apperception. Not all the experiences that take place within the pre-selected field can attract attention and therefore enter the field of apperception, but certainly only those that are in the pre-selected field can attract attention and enter the field of apperception.

Regardless of how many and what elements are contained in the field, our attention can be directed towards them *precisely because of the field itself*: it is within what we have previously defined as the "attentional regime". Selectors (such as optical technologies, for instance) are not content with delimiting the field: they try to *attract and maintain attention*. It is not a question of drawing attention to every single element in the field, but of drawing attention *to the field itself* and keeping it as long as possible.

The aim of techno-aesthetics here is to clarify in the best possible way that statement, expressed in chapter III, according to which interfaces, in particular visual ones, act in the field of the Boullier diagram delimited by the poles of alert and immersion. In particular, it must be explained immediately what we have to assume by "alert" and then clarify the mechanisms by which computers, through the screens, maintain the human component in this attentional regime; then we will connect this analysis to that partly already carried out on the mechanisms of immersion, to understand what effects are generated by this combination.

According to the diagram, alert is the opposite of fidelization. Although the interpretation of the diagram proposed here is rather free, I will maintain this polarization, which I believe is significant. Any analog medium, whether projective or immersive, focuses on the fidelization to the content, that is on a linear fruition (continuous or delayed, it does not matter), from the beginning to the end, which aims to exhaust and assimilate the proposed content. Reading a book, listening to a vinyl, watching a movie and even, in part, a television program (despite the practice of zapping), are or were attentional experiences characterized by fidelization. Contemporary digital visual interfaces, on the other hand, work differently, according to the principle of alert: they tend to shift our attention to always different contents to obviate the fact that a fruition on screen (in particular with regard to the fruition of texts[4]) allows a lesser assimilation of contents on which it is necessary to spend more time[5]. Alert can be generated through eye-catching

4 Cf. A. Mangen, B.R. Walgermo, K. Brønnick, *Reading linear texts on paper versus computer screen: Effects on reading comprehension*, in «International Journal of Educational Research», vol. 58 (2013), pp. 61-68 and A. Mangen, G. Olivier, J.-L. Velay, *Comparing Comprehension of a Long Text Read in Print Book and on Kindle: Where in the Text and When in the Story?*, in «Frontiers in Psychology», 15 February 2019 retrieved from https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00038/full (accessed 20 March 2020).

5 It is true that sometimes, even through digital screens, it is possible to access a continuous fruition of the same content, which has the characteristics of fidelization. A good example of this is the viewing of movies or the binge-watching of series on streaming platforms such as Netflix. It would be interesting to have statistical data on the degree of continuous attention actually devoted to the viewing of such content (without, for example, simultaneously checking the smartphone or carrying out other activities), but, even taking the viewing of streaming broadcasts as an exception to the paradigm of alert, we must recognize that the normal fruition of digital content (from browsing the web to flipping through different apps) is governed by alert

graphical elements, through a specific interface design or through the old pop-up device[6].

But the alert is not only the momentary capture of attention: it is also a state, precisely an attentional regime, it is the condition in which the human component remains "on alert", ready to receive and apperceive new stimuli. While the capture of attention on individual contents remains a question of design, the creation of the attentional regime of the alert is instead the prerogative of the material structure of the supporting optical technologies, namely the screens. The backlighting of the screens, for example, literally keeps us alert. Observing PC or smartphone screens in the evening or late at night can impact the circadian rhythm of sleep[7]: the blue lights of the backlighting of the LCD displays, in fact, have frequencies close to ultraviolet, a tone that our body is used to observing in the moments before dawn; this causes the production of melatonin to be activated, and therefore the attentional processes connected to it[8].

In a nutshell: screens can activate human attention and the single contents are designed so that it bounces from one to the other without giving any human individual time to get tired of any of them. But this is not enough to create a substitute for fidelization. The immersion effect is also necessary. In the previous chapter there has been extensive discussion of immersion and how it facilitates the capture of attention. Now, to be more precise, we must say that the attentional regime of immersion favors more than anything the *focus* and *duration* of attention. We have already seen how immersion is an effect of the technical architecture of the medium, but we must admit that, when it comes to media that offer one content at a time, immersion in the medium and immersion in the content coincide. When talking about digital visual interfaces, however, we have to recognize that immersion only concerns the medium and the field it creates and populates with

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and short duration.

6 Integration with other interfaces, such as sound interfaces, can also draw attention to certain visual elements.

7 *Blue light has a dark side. What is blue light? The effect blue light has on your sleep and more*, «Harvard Health Letter», published: May, 2012, updated: August 13, 2018 retrieved from https://www.health.harvard.edu/staying-healthy/blue-light-has-a-dark-side (accessed 20 March 2020).

8 I'm concentrating on describing the modes in which media through their material structure are able to maintain the alert. What I am overlooking, precisely to demonstrate the generality of this approach, is the content. However, it must be admitted that the kind of stimuli also has a role in *selective attention*: emotional stimuli, for instance, are more likely to be selected (cf. R.J. Compton, *The Interface Between Emotion and Attention: A Review of Evidence from Psychology and Neurosciences*, in «Behavioral and Cognitive Neuroscience Reviews», 2 (2003), pp. 115-129: 115). However, it has also been shown that the encoding of such emotional stimuli requires that attention remain focused on them (cf. L. Pessoa, M. McKenna, E. Guiterrez, L.G. Ungerleider, *Neural Processing of Emotional Faces Requires Attention*, in «Proceedings of the National Academy of Sciences», 99 (17) (2002), pp. 11458-11463). In this regard, there are strategies, once again linked to design or to the material structure of the medium, to convey emotions and capture attention through visual interfaces and a clever use of colors (cf. E. Andersen, A. Maier, *The Attentional Capture of Colour in Visual Interface Design: A Controlled-Environment Study*, in A. Maier, S. Škec, H. Kim, M. Kokkolaras, J. Oehmen, G. Fadel, F. Salustri, M. Van der Loos (eds.), *Proceedings of the 21 International Conference on Engineering Design (ICED17), Vol. 8: Human Behaviour in Design*, Vancouver, 21-25 August 2018, pp. 519-528).

different contents, which alert our attention from time to time.

The techno-aesthetic analysis of the interactions between human perception and digital media leads us to acknowledge the action of the latter on the pre-selective mechanisms: they place the human component in an attentional regime governed by the combined action of alert and immersion, which in turn creates a new type of fidelization, the fidelization to the medium. The user of contemporary digital technologies is more than ever *devoted to the screen*.

This surrogate of fidelization is much more powerful than the "classic" fidelization itself: it intensifies the attentive charge, always keeping it at alert level (while constantly moving it from one content to another), but *extends it over time*[9].

The digital screen, causing the sense of the frame to be lost (immersion) and using the attraction of the blue light (alert) mentioned above, is the perfect example of this combination and represents its hardware side. From the point of view of content, we could take the example of streaming platforms: the creation of a new standard of video duration (longer TV series episodes, shorter and shorter films, standardizing formats around an hour or an hour and a half), the automatic reproduction of the next episode or similar content, the possibility of multi-screening[10] are all phenomena related to the constant sending of impulses to maintain and then extend the threshold of attention of the user, even at the cost of shifting his attention from one content to another, from one screen to another, but still keeping it stuck to the same media system.

That digital technologies work in such a way as to attract and consume attention is a fact; what is to be asked, however, is whether this attention-consuming process is a necessary fact, or at least whether it makes sense, from the point of view of the machine. It has already been explained, in chapter III, that digital media, through interfaces, consume attention to perpetuate the passage of information. If a medium is such because it is designed to implement a process of mediation, which includes the production and passage of information, then yes, we must admit that, from the point of view of the machine, using the human component to perpetuate the process by capturing its attention, makes sense.

9 The capture and consumption of *time* is therefore a fundamental element of digital technologies and their visual interfaces. "Chronophagy" – i.e. the tendency to "phagocyte" the time of human beings, controlling it, managing it, addressing it alternatively to work or consumption – is a typical characteristic of capitalism (which, according to Marx, extracts plusvalue from the extra time in which workers work, in fact, at no cost to the owner), which intensifies in the digital age, that of the so-called hypercapitalism (where even free time is totally directed to the consumption or production of data that large corporations use to make money): cf. J.-P. Galibert, *Les Chronophages. 7 principes de l'hypercapitalisme*, Lignes, Paris 2014 and D. Mazzocco, *Cronofagia. Come il capitalismo depreda il nostro tempo*, D Editore, Roma 2019. At this point the question arises as to whether the equally chronophagous character of digital technologies is a product of the capitalist structure or a technical necessity. The answer is complex and nuanced, since, on the one hand, as will be explained in this chapter, the design of interfaces may be spoiled by ideological elements (the origin of which can be identified in the capitalist ideology), but, at the same time, one cannot fail to notice that information technologies are time-consuming for their "essence", since they need to be supplied with data (over time) to continue to function. This last aspect will start to be addressed shortly in this same section.

10 "Multi-screening" means both the opportunity to navigate over multiple interfaces simultaneously on the same screen, and the simultaneous media use, where the attention shifts from one screen to another, but almost never out of them.

To take the point of view of the machine, however, it is not necessary to anthropologize it or treat it as a phenomenologically intentioned subject[11]. It is sufficient, indeed, to de-anthropologize the discourse and try to enter into the (linear and binary) logic of the machine. To do this, once again, a rigorous archaeological investigation can help. The real challenge for a philosophy understood as mediology, on the other hand, will be to understand – or construct by understanding – the logic of a higher level, the new dimension of compatibility that governs the relationship and exchange between the human and machine components: the logic of mediation.

2. From attention to action.

In the logic of mediation there should be no totally passive components. Even when there is a dominant component that dictates the rhythm of behavior to the others, it would not only require attention, but to respond with behaviors, with *actions* that serve as *feedback* and perpetuate the process of mediation. Therefore, simply stating that visual interfaces serve to capture and consume attention is only the first stage of a process that aims to condition the action. But which is the link between attention and action?

2.1. Training.

A first link should be sought in the argument about *embodied simulation*, which we have seen before[12]: exposure to certain visual events can predispose to action, as it activates sense-motor neurons and creates a simulation of the action already at the neuronal level. From this clearly emerges the concatenated link perception-attention-predisposition to action. But what the machine component needs is for the human component to increasingly reduce its *response time* and automate its behavior as much as possible[13]. Embodied simulation must be *fixed* in a way that allows faster and faster early responses[14].

11 This is for instance the stance of Günther Anders, who, if on the one hand has the merit of being one of the first critics of technology not to place the focus of his analysis on the content of media or on alleged hidden persuaders, but rather on the very essence of technology, on the other hand assigns it a sort of (albeit metaphorical) "will to power" (cf. G. Anders, *Die Antiquiertheit des Menschen II*, cit., p. 117).

12 Cf. *supra*, p. 88.

13 Cf. *infra*, p. 156.

14 Once a pattern of motor response to a visual stimulus has been fixed by repetition, it will constitute an *expectation* with respect to future occurrences of a similar visual event. In other words, the visual stimulus creates an expectation («STIMULUS→EXPECTATION (S-E), or STIMULUS, ACTION→EXPECTATION (S-A-E)», G. Pezzulo, M.V. Butz, C. Castelfranchi, *The Anticipatory Approach: Definitions and Taxonomies*, in G. Pezzulo, M.V. Butz, C. Castelfranchi, R. Falcone (eds.), *The Challenge of Anticipation. A Unifying Framework for the Analysis and Design of Artificial Cognitive Systems*, Springer, Berlin-Heidelberg 2008, pp. 23-43: 24) and this expectation will replace or combine with the stimulus in future patterns of *anticipatory behavior* («(STIMULUS +) EXPECTATION → ACTION (E-A)», *ibid.*). This expectation should be treated as an induced pattern, but it can also be the product of an inference and can therefore be considered a *prediction*, although it is a standardized and somewhat automated prediction. In general, however, it can be said that «prediction is an event-oriented concept, *anticipation is an action-oriented concept*» (S. Bonizovski, L. Bonizovska, *Anticipatory Brain Potentials: An Electrophysiological Insight into the Anticipatory Behavior of Adaptive Learning Systems*, in M.V. Butz, O. Sigaud, S. Swarup (eds.),

In order for such simulation not only to be activated, but to imprint and become a habitual response, it is necessary for the human component to prolong its exposure to the visual event that causes it, that is, to keep its attention focused on it. And this is why, as observed in the light of a techno-aesthetic analysis, exposure to the stimulus of visual interfaces must be immersive and constantly solicited. This will lead the visual interface to *train* the human component.

Anthropocentric prejudice causes one to wince to the claim that a machine could train a human being, but this depends exclusively on the fact that common language assigns to the term "training" meanings such as teaching to animals, sports practice, or self-improvement. But training, actually, is nothing more than a kind of *learning process*, to be precise, what I here call training, in psychological literature is learning by *conditioning*.

Learning is a process through which an individual acquires new knowledge, skills, behavior, values, preferences. Psychology has studied different types of learning and has developed numerous theories. One type of learning – which in turn can be analyzed in different sub-categories – is conditioning, which is defined as «a behavioral process whereby a response becomes more frequent or more predictable in a given environment as a result of reinforcement, with reinforcement typically being a stimulus or reward for a desired response»[15]. Frequency and predictability are, from the machine's point of view, the "desired" results of human component training via interfaces.

Prolonged training causes a given situation, when it occurs, to trigger a standardized behavior as a reaction. An example of this is when a polite guest will automatically offer a chair to a person who has just entered a room, not because he or she inferred that the person needs a seat, but because of a standardized response to a certain stimulus[16]. Likewise, a visual event on an interface, even if it does not directly recall an action, can cause an embodied simulation of that action in an indirect way, since the behavior in response to that visual occurrence is standardized. For instance, the appearance of a notification on our smartphone will prepare us to touch the touchscreen to open it, regardless of whether we actually do it or not.

Indeed, the fact that one actually moves from a predisposition to action to actual action is not immediate. In addition to the linear conditioning that leads to an embodied simulation, a series of other personal, environmental, collective, human, and technical conditionings intertwine in the elaboration process that leads to the act, and, mediating among these, the actual action results.

In fact, the act should not be understood as a punctual and extemporary

Anticipatory Behavior in Adaptive Learning Systems (ABiALS). Workshop Proceedings, 2004, pp. 1-10: 9, italic mine).

15 *Conditioning (psychology)* (Encyclopaedia Britannica), retrieved from https://www.britannica.com/science/conditioning (accessed 20 March 2020).

16 «The offering of a chair to a person who comes into the room is in itself a courteous act. We do not have to assume that a person says to himself that this person wants a chair. The offering of a chair by a person of good manners is something which is almost instinctive» (G.H. Mead, *Mind, Self, and Society from the Standpoint of a Social Behaviorist*, University of Chicago Press, Chicago-London 1972, p. 15).

reaction, but *as a whole*[17]. Of this whole are necessary parts, even if not sufficient, also those cerebral states that constitute what we have called "predispositions", that is to say «what goes on in the central nervous system as the beginning of the individual's act and as the organization of the act»[18]. Therefore, predispositions already have the power to transform themselves into acts, or rather to be the initial parts of an act, that first prepare the central nervous system and then the muscles and other parts of the body in order to perform it. The predispositions therefore already contain in themselves the successive stages of the act, not only in the sense that they contain them in potential, but also that «they serve to control the process itself»[19].

The training, therefore, serves to graft in the central nervous system patterns of attitudes, predispositions, acts in potential that, otherwise, the untrained human being could not implement. A visual interface can therefore act by conditioning and training the human being[20], i.e. by teaching it new behaviors.

2.2. Transindividuality.

If we treat conditioning simply as a type of learning, we realize that it does not necessarily represent the "enslavement" of the human component to the technological or social system. The conditioning of human action allows the human component itself to structure its action in a new way, inserting it in causal chains that would otherwise be precluded. Thanks to the learning of new behaviors and the support provided by technical objects, the human being can overcome individual limits in the direction of that dimension that Simondon called "transindividual".

Transindividuality is the impulse to overcome individuality in the direction of the collective, going beyond the interindividual, or rough social. It requires the sharing of the *preindividuals* maintained by each individual for whom psychic individuality can imagine, but not implement, a structuring. Transindividuality is understood by Simondon as «the meaning of the being as separate and connected, alone and a member of the collective; [...] it is the meaning of the relationship between the individuated being and the collective, and, as a consequence, it is also the meaning of the foundation of this relationship»[21]. The simplest and most fitting description of this dimension that connects the individual by restructuring him is given by the author in this form: transindividuality «is defined as what *exceeds the individual while prolonging it*»[22].

17 Cf. *ibid.*, p. 8, footnote.

18 *Ibid.*, p. 11.

19 *Ibid.*

20 Peter-Paul Verbeek dedicates a brilliant essay to contemporary intelligent technologies which, through conditioning, including environmental conditioning, can persuade people to behave in a certain way (see P.-P. Verbeek, *Designing the Public Sphere: Information Technologies and the Politics of Mediation*, in L. Floridi (ed.), *The Onlife Manifesto. Being Human in a Hyperconnected Era*, Springer, Cham-Heidelberg-New York-Dordrecht-London 2015, pp. 217-227, in particular pp. 220 ff). The thesis that I, supported by the previous techno-aesthetic analysis, defend here, however, is that *all* media technologies – and not only intelligent ones – especially if equipped with visual interfaces, have a power of persuasion due to conditioning mechanisms.

21 G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., p. 246, my translation.

22 *Ibid.*, p. 274, my translation.

In all forms of transindividuality some aspects of individuality are repressed or inhibited, but, in exchange, other aspects are prolonged in space and time and new possibilities for action open up[23]. So also conditioning includes some renunciations or repression of certain behaviors that can be obstacles, but at the same time produces new possibilities for action and interaction.

Transindividuality is the information and structuring of a collective, but, although Simondon describes it above all from a humanist perspective, it is not only a human condition. De-humanizing the term "collective", we can speak of transindividuality as the structuring of a complex system that includes human individuals, machines, environment, who maintain a relationship with each other that leads to the best possible realization of the potentials of each of them. This relationship, passing through the information and the mediatazation of the creative effort of each component, as well as through the search for a common logic starting from the differences, can be defined as medial. Obviously, given the complexity of the interactions at stake, it takes little – any interface error between different components – to trigger a regression, a de-individuation, the exit from the medial condition.

This non-human-centered interpretation is also authorized by Simondon himself. According to the philosopher, in fact, the technical object is at the center of the transductive process that leads to the transindividual condition and participates in it. From the individual human point of view, it is what «define a certain crystallization of the human creator gesture and perpetuates it in the being [..., it] mediatize the human effort»[24]; this effort, then, «allows the individual to have a reactive awareness of his own action, and to be his own norm»[25]: it is, therefore, what allows the individual to really perceive himself as a free subject within a community, both as an inventor and as a simple rebuilder or conscious user. From a collective point of view, technical objects are those that allow authentic communication in society, capable of overcoming and restructuring the raw social patterns of mere interindividual coexistence[26]. But the important point of Simondonian ontogenetic theory lies in its analysis of technical objects in their particular process of *concretization* and in their participation in the transindividual condition both when they constitute themselves as an *ensemble* and when, through their associated *milieu*, they connect to human and natural elements.

Simondon calls "abstract technical object" a closed system, characterized by theoretical and material unity, with an intrinsic perfection in relation to the operation for which it was designed[27]. This object, although perfectly designed for its individual functions, will encounter enormous problems if it is included in an *ensemble*: its operation could conflict with that of other parts and therefore the resulting *ensemble* would need continuous adjustment and maintenance. When there is a need to insert a technical object into an *ensemble*, a new functional order must therefore be discovered that can include the greatest number of individuals in

23 Cf. *ibid.*, cit., pp. 273-276.
24 *Ibid.*, p. 340, my translation.
25 *Ibid.*, p. 341, my translation.
26 Cf. *ibid.*, p. 342.
27 Cf. Id., *Du mode d'existence des objets techniques*, cit., p. 24.

the *ensemble*, without, however, making them lose their autonomy in relation to human intervention; it is «a search for compromise between conflicting needs»[28]. For this to be possible, a technical individual with a greater degree of indeterminacy is necessary: the fact of being less perfect or less complete in itself, makes him a more "concrete" technical individual, i.e. more easily adaptable. In other words, a concrete technical object is an object that is perfectly in medial condition, along with the environment and other components of the system.

A concrete technical object is a technical object that "naturalizes", in the sense that, as adaptive, it is no longer limited by the linear causality typical of technical elements[29], but includes circular causality regimes characteristic of natural systems[30]. This is because, in the act of invention that represents the genesis of a technical individual, not only an object is individuated, but also the *milieu* with which it will have to interact and that, at the same time, will allow it to interact with other individuals (technical or not). This *milieu*, therefore, is both technical and natural and Simondon calls it a «*milieu techno-géographique*»[31].

This digression on the Simondonian theory of technical evolution serves to explain how the technical object and the human being interact and influence each other through *systemic causality*. We will deal with systemic causality in more depth by addressing the legacy of cybernetics, but now we should devote a few lines to the issue of technical individuation of the human being, and then place the interface within the system of relations outlined so far.

2.3. Technical objects and human action.

According to the French philosopher, the human being, through the learning of habits, gestures and patterns of action, learns to use tools and technical objects of various types, thus including itself in the individualization of the technical object: the human being becomes part of the associated *milieu* of the technical individual[32].

28 *Ibid.*, p. 26, my translation.

29 Simondon identifies three levels of the technical object: «*l'élément, l'individu, l'ensemble*». The elements represent the crystallization of technical operations, they are devices with a precise, linear function and are like the organs of a technical individual: they do not have a predetermined associated *milieu* and they acquire a function only if inserted in a technical individual; the typical example of an element is the thermionic valve (cf. *ibid.*, p. 80). The individual is, instead, a concrete and naturalized technical object to which a *milieu* is associated; it is composed of elements. At the level of the technical individual, circular causality emerges: that between the object and its *milieu* (cf. *ibid.*, p. 70). Ensembles are complexes of technical individuals, each with its own associated *milieu*; ensembles do not have a real *milieu*, but a *coherence* given by the synergy of *subsembles* constituted by individuals with at least parts of a common *milieu*. An audiometer, for example, is not an individual, but rather an ensemble, made up of different individuals, such as the power supply, the headphones or the loudspeakers (cf. *ibid.*, p. 75). These three levels of the genesis of the technical object are also reflected in the history of culture: the discovery of the elemental level corresponds to the optimism of the 18th century and the idea of continuous and defined progress; the technical individual is the one who is perceived as an adversary of man, as "rape of nature", and this would characterize the era of thermodynamics; the level of the ensemble would instead be the one on which Information Theory (i.e. *cybernetics*) in the 20th century is concentrated (cf. *ibid.*, p. 17).

30 Cf. *ibid.*, p. 56.

31 *Ibid.*, p. 68.

32 Cf. *ibid.*, pp. 96-97.

The thesis of learning by conditioning, explained at the beginning of this section, confirms and completes this Simondonian theory; on the other hand, framing the discourse on learning in this systemic and *milieu* perspective already leads to understand that the correct way of looking at conditioning is not that of blind and linear causality. The techno-determinism, exposed and sustained in the previous chapter, without being contradicted, can now be illuminated by a new light.

The co-individuation of technical and human individuals allows us to see technical objects as vehicles of transindividuality. They assume a purely medial function, producing, transporting or receiving information and informing, from time to time, human or natural components of a system. They cause the action of the human individual to exceed the limits of the individual itself, prolonging it: they are, at the same time, extensions of man (prolongations), as McLuhan would like, and escalations towards unprecedented possibilities, as Kittler suggests. The connection between technical objects and human components, as well as between different human components or human and natural components *through* technical objects, generates complex systems and emerging properties, such as circular causality. The human creative action can expand thanks to a technological medium, just as the action of a medium can condition human behavior; the feedback of the conditioned human being can be that of a learning that opens up new possibilities for action or a supply of data that the medium will transform into information, thus driving the systemic process forward.

In this theoretical framework, the interface assumes the role of *catalyst of transindividuality*. In fact, it is part of the medium, but it becomes *milieu* for the human being, capturing its attention and directing it to action; action that can be directed to the environment, to other components of the system or back to the medium, always through the interface. The interface is what more than anything else naturalizes and concretizes the medium, making it part of the natural environment and allowing the latter to act on it. The interface, at the same time object, technique, and milieu, is techno-geographic by its very essence[33].

If interfaces *are*, in a sense, techno-geographic, we must also consider what we might call the techno-geographic landscape: it includes human beings, the environment, machines, infrastructures and processes for the passage of information between its components. This landscape is a possible[34] medial system, tending towards self-regulation, in which each component directly or indirectly influences the others. For this reason, the best perspective from which to study it is *cybernetics*.

33 Particularly suitable for the purpose of integrating technology, environment, and culture are visual interfaces: the concept of land*scape*, in addition to having a geographical value, has an even etymological link with the concept of vision, so as to make it almost pleonastic to speak of "visual landscape", to refer to the set of visual messages conveyed by the environment, often through media interfaces. It is no coincidence that Appadurai, in coining the neologism "mediascape", referred to the repertoire of images and information distributed by television programs, newspapers, films, etc. (cf. A. Appadurai, *Disjuncture and Difference in the Global Cultural Economy*, in «Public Culture» (1990), 2 (2), pp. 1-24).

34 A cybernetic system is not necessarily a medial system: for it to be so, it is necessary that each component is in a medial condition, that is, in the condition of serving a mediation process.

2.4. Cybernetics.

Cybernetics, with its concepts of feedback and circular causality, recursiveness, complex system, etc., has been and can still be the most ambitious and influential theoretical project capable of framing a medial landscape in its unfolding and operating. To prepare those analytical tools that we will need in order to investigate the role of interfaces and human components in a cybernetic perspective, a brief digression on the foundations of this science will be necessary.

What is cybernetics? A definition that has the merits of brevity and clarity is this: cybernetics is a *general theory of machines*[35]. It is a pity, however, that looking at the subtitle of Norbert Wiener's book *Cybernetics*, from which the history of the discipline began in 1948, one immediately realizes that things are slightly different. This subtitle, in fact, states as follows: *or control and communication in the animal and the machine*.

Let's start with etymology: the suffix "cyber-", today mostly used as a synonym for "technological" or "informatized", comes from the Greek word κυβερνήτης which means "steersman". The concept of *steer* metaphorically refers to *control* or *government*[36]. It is in the latter sense that Plato speaks of politics, or rather of the art of government, as a κυβερνητικής τέχνη[37]. Starting from this Platonic metaphor, but giving it a broader meaning very close to Wiener's holistic project, the Polish philosopher Bronisław Trentowski, in his book *Cybernetyka* called for every human activity to be coordinated by a transdisciplinary administrator (the *cybernete*), that is, a person who knows all the different topics he has to deal with[38].

However, it is unlikely that Wiener was familiar with Trentowski's work, while it is certain that, in giving a name to his science of control and communication, he paid homage to Maxwell, who, mathematically describing the operation of the centrifugal speed regulator and identifying the conditions of its stable behavior, called it *governor*[39].

One definition that we could draw from reading Wiener's fundamental text is that of cybernetics as a *science of control and self-regulation*, which provides for a *unified study of natural and artificial systems*. The mathematical background is obvious, since the fundamental idea is that natural systems or artificial machines can be symbolized and studied through models. But cybernetics is not only mathematics: it was, especially in its early days, a vast interdisciplinary research program involving engineering, biology, humanities and social sciences. The point of unity of this

35 «[N]ot merely a theory of the machines that had been built already, but a theory of all machines, including those that had not been invented yet» (T. Rid, *Rise of the Machines. The Lost History of Cybernetics*, Scribe, Melbourne-London 2016, p. 4).

36 From the same Indo-European root from which the Greek κυβερ- (κυβερνάω, κυβερνήτης) derives also the Latin *guber-*, from which *gubernare*.

37 Cf. *Alc. ma.* 134e-135b; Plato, *Alcibiades*, tr. D.S. Hutchinson, in Id., *Complete Works*, cit., pp. 557-595: 594-595.

38 Cf. B.F. Trentowski, *Stosunek filozofii do cybernetyki czyli sztuki rządzenia narodem. Rzecz treści politycznej*, Żupański, Poznań 1843. In the same year, probably independently, Ampère also used the term *cybernétique* in his *Essai sur la Philosophie des Sciences. Seconde Partie*, Bachelier, Paris 1843, p. 142, once again to refer to political science.

39 Cf. N. Wiener, *Cybernetics. Or Control and Communication in the Animal and the Machine*, The MIT Press, Cambridge-London 1985, pp. 11-12. See also J.C. Maxwell, *On governors*, in «Proceedings of the Royal Society of London», 16 (1868), pp. 270-283.

systematic approach is found in *two concepts* taken from the philosophy of the one who is defined by Wiener as «the patron saint for cybernetics»[40], namely Leibniz: (i) universal symbolism and (ii) calculus of reasoning.

Surely Wiener's interest in a common symbolization of systems was born from the study of machines capable of simulating or describing human activity, as well as from the collaboration with Vannevar Bush on analog computers or with John von Neumann, engaged in designing the first all-digital computer; however, to conceive a unitary study of systems, it is not enough to establish a mere *analogy* between machine and living being. This analogy[41] is still established and practiced: the construction of machines that exemplify the basic concepts of cybernetics or that attempt to apply them to different areas of knowledge or social life, has always been a fundamental part of this enterprise, theoretical and practical together. However, the basic idea is much stronger: there must be elements and mechanisms *common to every organization that can be identified as a system*, be it natural or artificial.

2.4.1. System.

The very first of these common elements is the definition of *system* itself. System means an *organized totality*. In fact, it does not indicate a unitary entity, but not even a simple plurality[42]: it is *a set of elements and components* relatively autonomous in relation to some properties, but each one *dependent on and interconnected with* the other components; this set, moreover, has *its own properties*, observable only when considered in its totality; finally, it has a *dynamic essence* and fixity represents its death.

The system thus understood is partially different from the rediscovered synthetic Hegelian unity[43]: it is total, even though it is the result of partial movements; opposes relativism, since it cannot renounce constant references, but at the same time avoids absolutizing those references; it has a relatively stable (or metastable) balance, but it relies on an internal dynamic tension. The dynamism of the system and its search for a metastable equilibrium pass through the exchange between its components, through their structuring each other and giving a shape to the system itself. In other words, the system is such when there is a constant flow of *information*.

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40 N. Wiener, *Cybernetics*, cit., p. 12.

41 In systems theory, which has its origin and impulse in cybernetics, analogy plays a fundamental role (cf. V. De Angelis, *La logica della complessità*, Bruno Mondadori, Milano 1996, p. 267). Moreover, analogy can also be considered a type of logical calculation and can be formalized through mathematical proportion: it is what «allows to introduce unknown properties into already known significations and opposes any inductive reasoning, which on the contrary extends known properties to unknown cases» (E. Melandri, *La linea e il circolo. Studio logico-filosofico sull'analogia*, il Mulino, Bologna 1968, p. 268, my translation).

42 The use of the categories of unity, plurality, and totality refers to the Kantian categories of quantity (cf. *KrV*, A 80, B 106, III 093; I. Kant, *Critique of Pure Reason*, tr. P. Guyer, A.W. Wood, Cambridge University Press, Cambridge 1998, p. 212). In this case I use the category of totality, interpreting it as a synthesis of unity (coherence and organization) and plurality (composite nature).

43 Rather, it is a contradictory unity, governed by a negative dialectic (cf. T.W. Adorno, *Negative Dialektik*, Suhrkamp, Frankfurt am Main 1966, pp. 29 ff.).

2.4.2. Information.

The other element common to natural and artificial systems, in fact, is information. Wiener's mathematical definition of information is based on a suggestion by von Neumann and, in its simplicity and generality, can describe the basic behavior of any agent within a system, whether natural or artificial: «One of the simplest, most unitary forms of information is the recording of a choice between two equally probable simple alternatives, one or the other of which is bound to happen»[44]. This definition matches Claude Shannon's: the unit of information measurement (binary digit, i.e. *bit*) is defined as the logarithm to the base two of the possibilities of choosing among alternatives, being 1 bit = log2 (two choices, equally possible). The amount of information can be calculated as minus the sum of the multiplication of the probability value of each alternative by the logarithm to the base two of the same[45].

The information is therefore a "choice" between (at least) two alternatives. Each choice operation gives rise to a new course of action, to a restructuring of the material present in a system, to a new taking of form. Simondon, who, like cybernetics, gives centrality to the notion of information in his ontogenetic theory, exemplifies this process from a natural system: the genesis of the crystal. In an over-saturated solution – the French philosopher tells us – matter and potential energy coexist in the preindividual state. From the center of such a solution in tension, then, a taking of form, an information, a set of choices between possible structures (all virtually included in the material *a priori*, that is in the atomic and molecular characters) propagates, thus generating the shape of the crystal, setting limits, individualizing it physically. At certain pressures or temperatures, then, the crystal can undergo restructuring starting from its *limits*. These limits are therefore not fixed: they are rather *modulators* through which information has the possibility of spreading again[46].

2.4.3. Modulators and metastability.

This concept of "modulators" it is useful to understand the role of interfaces in a human-computer system. But before clarifying their task it is necessary to ask: why is it desirable that information, within a system, continues to propagate? Why are modulators needed? This is where the idea of *negative entropy*, or *negentropy*[47] – i.e. the tendency to heterogeneity and to the organization of a system – comes into play.

In short, a system, by definition, tends towards order and self-regulation, and therefore towards a procedure opposite to the entropic one, which is said, precisely, to be negentropic or *syntropic*. Examples of this can be found as much in nature – where entropic processes correspond to equal and opposite syntropic processes[48] –

44 N. Wiener, *Cybernetics*, cit., p. 61.

45 Cf. Shannon, C.E., Weaver, W., *The Mathematical Theory of Communication*, cit., pp. 8-16.

46 Cf. G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., pp. 85 ff.

47 Cf. N. Wiener, *Cybernetics*, cit., pp. 56 ff. and G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., pp. 219. For the first occurrence of the term "negentropy" see E. Schrödinger, *What is Life? The Physical Aspect of the Living Cell*, in Id. *What is Life? with Mind and Matter and Autobiographical Sketches*, Cambridge University Press, Cambridge 1992, pp. 1-90: 70-71.

48 Cf. L. Fantappiè, *Principi di una teoria unitaria del mondo fisico e biologico*, Di Renzo, Roma 1991. At

as in machines that tend towards self-regulation and balancing[49]. The organization requires an *expenditure of energy*, an increase of information within the system and for this reason cybernetics identifies information and negentropy, making them inversely proportional to entropy.

From the point of view of communication within a system or between different systems, greater organization (and therefore greater quantity of information) means greater ease of communication, while the greater the entropy, the less effective the communication will be. For this reason, in order to keep communication at an optimal level, it is necessary that the amount of information does not disperse and therefore the modulators mentioned above are required.

Simondon criticizes this notion of negentropy, or rather the perfect identification of the concept of information with that of negentropy. According to the author, cybernetics says that a system tends to organize itself and that to do so it needs an increase in information, which has the function of connecting the different elements that will have to compose it; so, however, it would seem that, once the organized state is reached, the amount of information must be reduced again, if not zeroed out. For this reason Simondon believes that even Information Theory wants to lead us to the idea of a good final form characterized by a low amount of information[50]. Beyond the legitimacy of the criticism[51], the idea introduced by the philosopher to complete the characterization of information within a system is very interesting. He proposes, in fact, to combine the notion of *quantity of information* with that of qualitative *tension of information*: there is the condition of possibility for a good form when there is maximum tension of information and there is maximum tension of information when a system *approaches contradiction without being in contradiction*[52].

Good form, therefore, which is *metastable equilibrium*, arises when this tension is resolved by putting into a functional order terms that previously appeared incompatible, without any of them being sacrificed or suppressed - and thus resolving, not annulling the tension. For this reason, we need modulators that maintain a constant tension of information and that put different orders of

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the basis of the concept of self-regulation of a system, however, is the concept of homeostasis, developed for the first time by Walter B. Cannon: see W.B. Cannon, *Organization for physiological homeostasis*, in «Physiological reviews», 9, 1929, pp. 399-427.

49 It is not necessary to imagine extremely complicated machines or sophisticated computers in order to think of an artificial self-organizing system: it is sufficient to take into account the functioning of a thermostat, in which a sensor activates a switch that turns on or off a heating (or refrigerating) system if the temperature drops or rises above a predetermined limit. It is no coincidence that sensor devices were among the first examples of "cybernetic machines". To show the physical-biological concept of homeostasis and apply it to the construction of artificial systems, William Ross Ashby built an electromechanical device called a homeostat (cf. T. Rid, *Rise of the Machines*, cit., p. 54).

50 Cf. G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., pp. 548 ff.

51 As said, cybernetics also bases its concept of system on an idea of *dynamic equilibrium*, which requires that the amount of information is not reduced, in an effort to keep the system in its organized condition, or to return it to it after a momentary entropic-catabolic phenomenon. Moreover, the analysis of *open systems* and their interactions with the environment and the notion of *feedback* would seem to deny the possibility of an interruption in the passage of information due to the achievement of stable forms.

52 Cf. *ibid.*, p. 550.

compatibility into communication, without sacrificing their own functions. It is probably already evident that this function seems to correspond to the general definition of interface given in the chapter III.

Modulators, or interfaces, ensure communication between the different parts of the system, thus allowing control of the system over itself, i.e. self-regulation. A rather simple example, applied to artificial systems, is that of the sensors. An optical sensor, for example, is a photoconductive device that measures an incident light change in terms of resistance variations; it is what Simondon would define an "element" and, if inserted into a more complex system, can have different functions, such as, for example, activate – when the light source, natural or, as in the case of an infrared system, artificial, is covered by the passage of a body – a relay, which will turn on a light or open a door. Sensors are interfaces between the machine and the environment and allow the emergence of systemic properties, i.e. properties that do not belong to any of the components taken individually, but emerge within their interaction, communication, and cooperation to self-regulation. The main of these emerging properties is *feedback*.

2.4.4. Feedback.

The concept of feedback is introduced and illustrated by Wiener starting from the observation of some neurological dysfunctions[53] such as ataxia or loss of proprioception[54], which leads him to conclude that «for effective action on the outer world it is not only essential that we possess good effectors, but that the performance of those effectors be properly monitored back to the central nervous system, and that the readings of these monitors be properly combined with the other information coming in from the sense organs to produce a properly proportioned output to the effectors»[55].

In other words, Wiener identifies in the circular movement of information (from the environment to the central nervous system through the sense organs and then from these again to the "effectors", that is to those organs that can produce a change in the environment[56]) a basic mechanism of biological functioning. The thesis of the feedback mechanism once again underlines the very close link between perception and predisposition to action[57], passing through the construction of a

53 Cf. N. Wiener, *Cybernetics*, cit., pp. 95-96.

54 As for the loss of proprioceptive sense, see Oliver Sacks' books, such as *The Man Who Mistook His Wife for a Hat*, ISIS, Oxford 2010, and in particular chapter 3, *The Disembodied Lady*.

55 N. Wiener, *Cybernetics*, cit., p. 96.

56 It goes without saying that this circularity is not interrupted by the return to the environment (which, for that matter, is not even necessarily the beginning of the path): any modification in the environment (which includes other individuals and is part, as Simondon teaches us, of the techno-geographic system) produces a modification on the sense organs, then on the nervous system and so on. As long as all the actors are active and receptive at the same time, information will continue to circulate.

57 In this sense we can say that Bergson was right in stating that «our perception of an object distinct from our body, separated from our body by an interval, never expresses anything but a virtual action» (H. Bergson, *Matter and Memory*, tr. N.M. Paul, S. Palmer, Zone Books, New York 1991, p. 57), while the cerebral state (principle of motion) is an action that has begun (cf. *ibid.*, pp. 13-14).

field of attention[58] that includes individuals, objects, and environment in a single perceptual-active *milieu*.

But feedback is not only the basis of the mechanism of information circulation in biological systems, but also in electrical or mechanical systems. Wiener, in 1948, bore as examples those of the signal tower, the thermostat, or Maxwell's governor of a steam engine[59]. In all these cases, sensors or transducers are involved, which collect data, translate them into information, which regulates the operation of the machine. These are rather simple systems, but similar mechanisms of information circulation and self-regulation also occur in much more complex systems, such as those that require a constant supplement of data and information flows and that need more input so as to generate a more complex output (which is actually a set of outputs[60]). Therefore, in the case of more complex systems, more complex modulators will be necessary, with more sensors to act as input, but also with more intermediate outputs that regulate the functioning of the different components. These modulators will be both inside the machine (intrafaces) and outside, in particular when there is the need to interface with human components.

A system as complex as the human body, but also as a computer or, even more so, as a communication system that includes human, machine, and environmental components, voluntary and involuntary feedback, contains a huge number of "joints" and «[t]he output is an additive vectorial combination of the outputs of all these joints»[61]. Each joint is, in a sense, an interface and joints between very different elements or systems involve suitably complex translation and control mechanisms. In contemporary communication systems between the technological apparatus and the human environment, each machine usually is or contains a computer, which connects it to a network of other machines and to human components, which supply it and the network with useful feedback to perpetrate its activity or to have it modified when necessary. «This means many humans interact *with* and *through* many machines»[62].

In this sense, visual interfaces are the most striking example: their task is to give a representation, adequate to human perceptive faculties, of logical-mathematical processes and operational elaborations comprehensible, in fact, to the machine alone in terms of physical signals. They do this by translating the imperative language of the machine into images, texts, visual entities that are more familiar to the human component, who can thus interact with them, assisted also by other accessory interfaces, sound or haptic, which help him to produce changes or better explore the visual landscape.

2.4.5. The role of the interface.

But we must not make the mistake of thinking that the visual interface is a purely aesthetic device, superfluous for the machine and at best pleasant for the human being, who could get rid of it if only it decided to enter once and for all in the

58 «Our attention enables us to organize the field in which we are going to act» (G.H. Mead, *Mind, Self, and Society*, cit., p. 25).

59 Cf. N. Wiener, *Cybernetics*, cit., p. 97.

60 «[W]hen we add inputs, we also add outputs» (*ibid.*, p. 97).

61 *Ibid.*, p. 107.

62 T. Rid, *Rise of the Machines*, cit., p. 2, italic mine.

perspective of the machine. “Seeing” as a machine is, for the human component, simply impossible: even if we just interact with it through calculation and learn to program, we would still frame this experience through an interface, most likely visual, which would allow us to visualize, in fact, our calculation, the code through which we program, the scheme of a circuit we want to build, etc. To believe that one can master the “language” of the machine and that one can put oneself exactly from its point of view, is to ignore the autonomy of technology, the logic of escalation that sustains it.

The interface should instead be studied as a *cybernetic object*: it serves to put in *communication* two systems that speak different languages and to ensure that, through a system of cross *feedback*, they *control* each other. Through the interface, the human component can visualize the operations of a machine, control them and correct them when necessary; at the same time, the machine component gives instructions to the human component, trains it and tries to adapt it to its own time scale. This allows us to add a piece to our philosophical-mediological study of visual interfaces: we have understood that they determine and condition perception and, through this conditioning, predispose to action; but now we can appreciate the fact that this linear conditioning fits into a wider and more circular context. We will return to this point in a moment.

In this sense we must recognize that *the interface*, as a cybernetic device connecting human and machine systems, *is necessary*. As we shall see, it may not be necessary for it to be exactly as it is now, but it is certainly an indispensable technique, which guarantees that information continues to circulate and enliven the medial system.

This way of looking at the visual interface helps us to take a step beyond the techno-determinism defended in the previous chapter: this does not mean abandoning it, but rather appreciating it in its entirety, leaving behind its naive linear conception. Even if we admit that we cannot escape from the conditioning operated on our perception and, consequently, on our predisposition to action by interfaces, even though we recognize that we cannot leave the media environment in which we are inserted, the importance of this theoretical reflection consists in the attempt to look at the dynamics of the system and thus to recover awareness of both the conditioning and of our own role in these causal chains.

As mentioned above, this outlook on interfaces focuses mainly on three – typically cybernetic – aspects that concern them: *control*, *communication*, and *feedback*. In the light of each of these three concepts, we can see how the linear deterministic conception is short-sighted.

2.4.6. A new conception of determinism.

In an ideal medial condition, the *control* between components is always reciprocal and forms the basis of the system's autoregulation. From the point of view of the machine, the interface serves to focus the human component on the flow of information that the computer needs, as well as to train it to the correct use, which would be to constantly supply computer with inputs; from the human point of view, however, the interface is what, while cutting out a potential part of the perceptible, opens up new possibilities for action and, moreover, allows interaction and

intervention with corrections on the operation of the machine.

This two-way control is achieved through *communication*: each component controls the other by exchanging information with it, and then in-forming it literally. The information flow describes very well the process of communication between machines, but the same thing happens when a machine component and a human component are involved; the difference lies in the fact that, in the latter case, the nature of the inputs is different and therefore a translation is required, the one made by the interface. Moreover, as already said, the interface works as a catalyst, since it expands the possibility of communication (and therefore of control) going beyond the simple binary relation: the machine is able, as said in chapter III, to induce standardizations of attentional regimes, that is, to influence not only the single human component, but the whole of these components united in a social body; the human being is able to act simultaneously on a plurality of machines and, through them, on a larger *milieu*, which also includes environment and other human components.

But the mechanism that concretely implements control through communication and that makes bidirectionality become, in fact, *circularity* (thus bringing out a new level of causality, inconceivable at the stage of individual components) is *feedback*. Feedback causes a component to modify itself according to a certain response obtained in an exchange of information with one or more other components. The process takes place in a circular exchange and produces self-modifications based on the flow of information, not direct modifications in which one component is passive and another active and performing. If we look at single "pieces of apparatus", at elements internal to a technical individual, or at simple interactions in which only a controller and a controlled one exist, then we still observe linear causality[63]; but when we shift our gaze to the complex system, or observe points of intersection and exchange such as interfaces, we can realize that the regime that supports the overall interaction is that of *circular causality*. This not only allows us to reconsider the role of the individual components of the system (such as, for example, the role of the human component, which a linear techno-determinism would relegate to absolute passivity), but it is also what allows the system to function more efficiently, because feedback serves to diminish the dependence of the system on the characteristics of its components[64].

As I said, it is not a question of denying, in the light of the above notions, the technodeterminism stated in the previous chapter: the conditions and determinations imposed by technology on human components are probably not avoidable. But what I believe the recovery of the original theoretical project of cybernetics helps us to do is to frame the concept of determinism within a systematic framework. It is certainly not a question of denying the trivial fact that causes have effects; rather, it is a question of saying that an effect can retroact on causes, modify their action, so as to produce further and new effects. This also means that, although at the linear and simple interaction level the effects are predictable, at the system and complex interaction level the effects may not be predetermined (although a finite set of possibilities may be predetermined), the

63 Cf. N. Wiener, *Cybernetics*, cit., pp. 97-98.

64 Cf. *ibid.*, p. 108. To use Simondonian terms, feedback is what allows the system to *concretize*.

paths leading to such effects may also be unpredictable, and the causal chains may only be reconstructed *a posteriori*.

Determinism is not denied, but is included in the light of the notion of information and finds counter evidence both in the functioning of biological systems, and in that of artificial, machinery, and, today, digital systems. This is the most important legacy of cybernetics.

This broader meaning of determinism also allows us to reintroduce even the concept of *purpose*, especially in the sense of "inner purpose". However, one point must be clear: inner purpose does not mean *entelechy* in the Aristotelian or post-Aristotelian sense[65]. If we consider the individual – physical, biological, psychic, collective or technical – as Simondon does, then we recognize that each individual carries with him pre-individual potential yet to be structured, but we know that it does not go in a predetermined direction, because «the individual is an operative transduction, not a virtuality that actualizes itself»[66]. According to this theory, it must be recognized, on the one hand, that the entelechy is not only individual or personal[67], since the individual accomplishes its own individuation (or concretization) always along the lines of a transindividual overcoming in the direction of the collective (or of the system), on the other hand that it would be rather correct to speak of *entelechies* in the plural, that is as a beam of virtuality that direct and pre-form, but are not enough to determine entirely an individual[68]. A transductive conception of the inner purpose considers entelechies in a more functionalistic sense and affirms that their plurality and non-decidability is actualized in different ways according to the circular process of feedback.

Cybernetics allows us to dismantle the ancient opposition between finalism and mechanicism. Cybernetic or informational teleology will therefore be based on two pillars: inner purpose and transduction.

As far as the inner purpose is concerned, the above shall apply. Obviously there are different inner purposes depending on whether the component is human or mechanical. In both cases it will be plural, open and, above all, not innate and essential, but determined and constructed. The entelechies that determine a human individual's psychic and collective development depend, in fact, on previous individuations (physical and vital) that create a set of possibilities, as well as on the encounter with other individuals in development that will allow to unite the

65 Entelechy (ἐντελέχεια) means the tension of an entity towards its perfect realization according to its own laws and therefore intrinsic (cf. *De Anima*, II, 412, a27-b1; Aristotle, *De Anima*, cit., pp. 48-49). The term is sometimes understood as synonymous of *actuality* (ἐνέργεια), although the latter would seem to indicate rather the process of actualization of a form, whereas entelechy would indicate the perfect realization of a substance, already inscribed, however, in the form of possibility, in the entity. The same term is used by Leibniz to describe the monad (cf. L. Strickland, *Leibniz's Monadology*, cit., p. 27) as it has in itself the perfect organic purpose of its development. In every use, however, this term presupposes the idea of one and only one final cause, of a linear development towards a single possible purpose, already predetermined. Obviously, such a conception would be in contradiction with the form of determinism in the light of the notion of information that is exposed in these pages.

66 G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., p. 170, my translation.

67 Cf. *ibid.*, p. 216.

68 Cf. *ibid.*, p. 230.

potentials of each in order to carry out actions impossible on an individual level. As far as technical objects are concerned, finality is introduced into design: Simondon states that the rise of information theory (cybernetics) would have foreshadowed the end of the "primacy of finality", since it brought with it the discovery of the possibility of including purpose in technical design[69]. This, however, with the exception of the technical elements (which perform a single function, as "crystallized technical gestures"), does not mean that the purpose introduced through design reduces an object to a single and unique possible function: a technical individual changes its functions (within a predetermined set of possibilities) depending on the feedback it receives, on the environment with which it interacts and, moreover, it contributes to the emergence of new functions when inserted into a system. In the case of a *medium*, as mentioned in chapter II, the purpose included in the design is that of *mediation*, which includes in itself a plurality of functions and is by its very definition a relational purpose and therefore with open outcomes.

The realization of these inner purposes of the components, as well as of the entelechies of the system, is regulated by a transductive process. For Simondon *transduction* is the operation in phases and jumps, which solves tensions and problems and allows the preservation of information in its entirety. It is the discovery of new orders of compatibility within the potential of an individual who is structuring itself, or between apparently incompatible elements, individuals or systems in communication[70]. Although the transductive process preserves a tendency given by entelechies (and the fundamental tendency is to preserve the circulation of information for the survival of a system), the outcomes remain open because they depend on inputs and the selection made between these inputs in accordance with the tendency. That is what, in essence, Mead called «a natural teleology, in harmony with a mechanical statement»[71].

Incorporating finalism into mechanistic determinism means rereading determinism by including a certain amount of unpredictability and openness of outcomes, but without sacrificing in any way the fundamental assumption that in an interaction there is always an action of one component on another that determines, in whole or in part, the subsequent behavior and a change in the system. Philosophy as mediology must recover this legacy of cybernetics in order to correctly read medial interactions.

However, what has been described so far are the principles of an ideal

69 Cf. Id., *Du mode d'existence des objets techniques*, cit., p. 149.

70 «By transduction we mean an operation, physical, biological, mental, social, by which an activity spreads progressively within a domain, basing this propagation on a structuring of the domain operated from place to place» (Id., *L'individuation à la lumière des notions de forme et d'information*, cit., p. 32, my translation). This structuring operation is not simply the passage from potentiality to actuality, because at the origin there is a *tension* - which is problematic and preindividual tension in itself and not tension between, say, a given matter and form –, which is resolved in an inventive act: «The extreme terms reached by the transductive operation do not pre-exist to this operation; its dynamism comes from the primitive tension of the system of the heterogeneous being which dephases itself and develops dimensions according to which it structures itself; it does not come from a tension between the terms which will be reached and deposited at the extreme limits of the transduction» (*ibid*, p. 33, my translation).

71 G.H. Mead, *Mind, Self, and Society*, cit., p. 6.

functioning of the system, in which each component "exploits" the full potential offered by the others and in which information circulates and structures its domain without obstacles. This is an ideal medial condition, but it is not easy to achieve.

If the analysis of interfaces proposed here has a purpose, it is to explain not only in what way, but also why they condition the human component; now it should be understood that these conditionings are functional from a systematic point of view. But then why is it that the human component is often not aware of conditioning and is therefore passive instead of interacting? Does this non-recognition have negative effects on the system or on the human component? These questions should be answered by an ethical-practical reflection on human-machine interaction.

3. Non-recognition.

From a philosophical-mediological point of view, the non-recognition of the circular logic on which the human-machine interaction is based brings with it the effect of a closure of the medial condition. In other words, there is a risk of losing the metastability necessary for each component to restructure and contribute constantly through the circulation of information and feedback mechanisms. This closure has undesirable effects on the system, both at the level of the machinery component and at the level of the human component.

From the technical apparatus perspective, the most likely effect is that of *technological stagnation*. This statement must not be misunderstood: it does not mean that the evolution and improvement of technologies do not occur. In fact, it is absolutely plausible that media improve, become more efficient, more accurate, faster, able to receive, store or send more information, without however producing new technical individuation or favouring transindividual connections. The so-called "digital revolution" gives us an example.

Despite numerous innovations in the digital field, the operating principles inscribed in circuit design and in programming languages remain the same. When the dominant interface has come to standardize attentional regimes, and therefore codified ways of use, the development of technologies is not directed to experiment on friction and search for new balances within the interactions, but to repeat always the same type of information exchange, making it at most simple and "user-friendly". In short, the relationship between human beings and digital technologies, to use a Simondonian terminology, has been directed towards a preservation of the quantity of information (or even of an increase in it), but towards a reduction in the tension of information. This acquiescence means that system relations are no longer guided by an experimental intent and that other competing logics take over, such as, for example, the economic one which, by dosing the release of innovations designed years earlier on the market and deciding which ones to carry on and which not, conditions a "free" development of technologies and discourages autonomous experimentation.

The phase here called "stagnation" or "acquiescence" corresponds to the second phase of media development identified by Marshall McLuhan[72]. According to

72 Cf. M. McLuhan, E. McLuhan, *Laws of Media. The New Science*, University of Toronto Press, Toronto 1988.

the Canadian scholar, in fact, there is a *first phase* in which the new technology itself is subject to attention and *avant-garde* experimentation, followed by a *second phase* in which the new technology becomes a simple commodity and the focus shifts from the medium message to the ubiquitous content. This second and last is the phase of *cultural accommodation*, the phase in which the *new* technology become a simple technology.

Some hope for the arrival of a new phase, a *post-digital phase*, in which a critical reflection on digital[73] becomes possible, in order to reach a full awareness of the influence of digital culture and technologies on human modes of perception, cognition and action. However, the term "*post*-digital" seems to refer to a a kind of reflection that comes only *after* digital age, as if to say that media theory, as a sort of cybernetic owl of Minerva that spreads its metal wings only with the fading of neon lights, is able to really put a medium or a medial system on the subject only once it is overcome. The challenge that a philosophy as mediology should propose, instead, is to determine if this awareness can be recovered in the moment of mass use and if it can lead to new experimentations and to the full expression of the potential of the current medial system. In other words, it is about identifying the conditions under which an optimal medial condition can be restored.

From a human standpoint the exit from the medial condition involves the repetition of a *non-performative feedback*. By this I mean that, instead of contributing to an increase in the tension of information, the human component merely perpetrates its circulation, supplying the machine component with the feedback it needs to simply continue to function.

This involves being outside interaction, in the sense that the action of the human component is never the same and contrary to that of the machine component. The human being limits itself to executing the instructions that the interface dictates to it, so as to use the medium "well", but without experiencing through the medium; also the connections that the medium creates between human and environment or with other components fall within the category of predicted ones, according to pre-designed methods. Remaining out of the interaction means encouraging the *impression* of a linear use of the medium, but this exposes to the linear and conditioning action of the technical component.

The risky consequences, in the human realm, of such a closure of the medial condition are those of *disindividuation*. This concept, which echoes Simondonian terminology, is introduced by Bernard Stiegler, who

> takes from the Derridian reading of Plato's *Phaedrus* the concept of *pharmakon*, i.e. remedy and poison, attributed to writing, and extends it to any technical support that, on a transindividual level, can be brought into contact with the Simondonian psychic individual through the transmission of emotional and cognitive significations[74].

The concept of φάρμακον applied in this way indicates that media can have both an individuating and a disindividuating function: on the one hand

73 Cf. C.U. Andersen, G. Cox, G. Papadopoulos, *Editorial*, cit.

74 P. Vignola, *L'attenzione altrove. Sintomatologie di quel che ci accade*, Orthotes, Napoli-Salerno 2013, p. 82, my translation. Regarding writing as a φάρμακον in Derrida see J. Derrida, *Plato's Pharmacy*, in Id., *Dissemination*, en. tr. B. Johnson, Continuum, London-New York 2004, pp. 67-186.

grammatization, «that is the dynamics of exteriorization-archiving of memory»[75], technical process *par excellence*, accompanies and determines the collective individuation, since it makes possible the passage of information on the transindividual level; on the other hand, there are now «cognitive exploitation dynamics»[76] made possible by the information technologies themselves, which can lead to alienation and loss of individuation. Such technologies, in fact, could capture «attention and libido of users for commercial and, more generally, consumerist purposes»[77].

Stiegler's thesis therefore goes in a direction very similar to ours: in an ideal medial condition, what he calls *relational technologies* (*R Technologies*)[78] – and which we could even simply call media – favor transindividuality and therefore the emergence of new system properties and new levels of causality; however, if the medial condition is affected by external and extraneous logics, these will bend it to the economic exploitation of both the human and machine components. A difference with the mediological perspective could lie in the fact that Stiegler would seem to attribute the responsibility for disindividuation more to economic logics coming from outside the system of human-technical interaction. However, he also recognizes that certain dynamics become possible thanks to the R Technologies themselves: structures, dynamics and ideologies already present outside the technical-medial apparatus tend to reverberate and be amplified through the action of media, which, moreover, introduce new possibilities of action and media-induced behaviors.

If for Stiegler the battle for a more fruitful use of technologies should not be conducted on the level of techniques, but on that of *politics*, so we shall see that it will be partly also for a philosophy understood as mediology. The difference, however, will be that, from a mediological point of view, political reflection will also have to include non-human agents. Before going into the features of a political philosophy in the light of the concept of information, in fact, one must ask once and for all: who is responsible for the breakdown of the medial condition? The human component or the machine component?

In a 1968 video interview, given to Jean Le Moyne and realized for the Ministry of Education of Quebec, Gilbert Simondon states that our society is not *too* technicalized, but rather *badly* technicalized.[79]. This sentence could be interpreted in both directions: one could think that the technical apparatus are badly designed, and therefore not adequate, or one could think of a lack of *technical culture* on the part of users, who are not able to exploit the innovations proposed by technology in the best possible way. Simondon is more inclined towards the second answer, but we can say that, in the panorama of theoretical reflection on technology and media, both hypotheses have been advanced. To stay on Simondon, the second option will

75 P. Vignola, *L'attenzione altrove. Sintomatologie di quel che ci accade*, cit., p. 83, my translation.

76 *Ibid.*, p. 83, my translation.

77 *Ibid.*, p. 84, my translation.

78 Cf. B. Stiegler – Ars Industrialis, *Réenchanter le monde. La valeur esprit contre le populisme industriel*, Flammarion, Paris 2006, pp. 38 ff.

79 The complete transcript of this interview, with an introduction by Vincent Bontems, can be found in G. Simondon, *Entretien sur la Mécanologie*, in «Revue de synthèse», t. 130, n° 1, 2009, p. 103-132. For the passage referred to, see p. 109.

be reviewed first.

According to the French philosopher, in fact, thanks to the recovery of a certain "technical culture", we can try to bridge the gap between culture and technology, between the human world and the technical universe, restoring an equal and interactive relationship. According to the author, a lack of technical culture can provoke two different and opposite attitudes, namely optimistic encyclopedicism and techno-catastropheism. Both these attitudes are inadequate in that they are placed on a partial level of analysis: the first stops at a (human) individual-(technical) elements relationship, while the second takes into account that of (human) individual-(technical) ensembles interaction. In short, both lack a correct analysis of *technical individuality*, such as the one that the author of *Du mode d'existence des objets techiques* tried to carry out.

This bivalence of technical thought is well present, for Simondon, in the current capitalist system and in the capital-labor conflict. Marxism, in analyzing this problem, apparently committed a misunderstanding: at a structural level, before the relations of production, the relation (or discontinuity) between the human individual and the technical individual should be considered[80]. Therefore, it would not be the union of capital and labor, implemented through the modification of the ownership relations of the means of production, that would annul the alienation, but rather the discovery of the median order between two kinds of relations. The workers, in fact, in the understanding of the objects, stop at the level of the elements; the owners, instead, treat also the technical individuals as if they were ensembles, not conceiving the notion of associated environment[81].

The therapy prescribed by Simondon to heal this corrupt relationship with technology lies in the awareness of the existence of an individuality of technical objects, in the discovery of the parallelism between the transmission of *technicality* in a technical evolutionary line and the act of invention in thought, and in the acquisition of an adequate technical culture. In essence, the technical individual must be rediscovered as a relatively autonomous agent, but, at the same time, subject to external and environmental influences, exactly as a human individual; and, again like the human individual, it can be treated as a component of a larger medial system.

But what exactly does Simondon mean by "technical culture"? In part it has already been said, but it is good to make it explicit here: he understands this expression mainly in two ways which are the (i) understanding of the functioning and genesis of technical objects and the (ii) understanding of the relationship between human individuals and technical objects. If the first aspect is undoubtedly the field of investigation of media theory, the second seems to be more proper to a philosophy understood as mediology, in particular in its ethical-practical facet.

The aforementioned relationship is triadic, and in it the machine always occupies the middle position; «the machine is thus a *vehicle for action and information*, in a three-term relationship: human, machine, world»[82]. In particular, the machine that, by definition, always carries out this *vehicular function* is the middle term: it is

80 Cf. Id., *Du mode d'existence des objets techniques*, cit., p. 165.

81 Cf. *ibid.*, p. 166.

82 *Ibid.*, p. 98, translation and italic mine.

less than a potential oppressor of the human being, but it is more than a mere tool; it is a necessary means for the current human-world relationship. This relationship usually develops in two directions: human → world and world → human. Human beings act on the world, while the world modifies human beings by informing them: human beings know the world and relate to it by acting on it and modifying perceptions and thoughts on the basis of it. The true double relational scheme, therefore, is: human → action → world and world → information → human. If the medium is conceived as a vehicle of action and information, it is the center of the relationship in both ways[83].

This two-way scheme, read through the holistic lenses of cybernetics, allows us to detect some important facts. For instance, we can see that the concepts of action and information are translatable: if the world *informs* the human being in a similar way to how the human being *acts* on the world, then it is not inappropriate to also consider the world, or the environment as an *agent*. Similarly, the medium, which manipulates information and is a means of action, can be said to inform or act in turn. But this de-anthropologization of the concept of "agent" and this notion of "action" will be resumed later. So far we are only interested in noting how Simondon identifies in the human misunderstanding of the medium's position in the human-world relationship[84] the root of the "bad technicalization". Similarly, Norbert Wiener attributes the bad relationship between humans and technology to a human "deficit".

Following Wiener, the *moral problem* of the interaction between human beings and machines is very similar to that of *slavery*. The concept of slavery, according to the father of cybernetics, is not only morally reprehensible, but is also self-contradictory: «[w]e wish a slave to be intelligent, to be able to assist us in the carrying out of our tasks. However, we also wish him to be subservient. Complete subservience and complete intelligence do not go together»[85].

In the same way, if we demand maximum efficiency from the machine, we can only make it process information at a speed that does not allow us to observe and reconstruct every step of it; but this means that, although we believe that this maximum efficiency is to our exclusive advantage, the human user will not always be able to predict the results of the machine process. Wiener again:

> It may be seen that *the result of a programming technique of automatization is to remove from the mind of the designer and operator an effective understanding of many of the stages by which the machine comes to its conclusions* and of what the real tactical intentions of many

83 Cf. *ibid.*, pp. 98-99.

84 One could be led to say that, in a Simondonian perspective, the medium would be a sort of human-world interface. This could also be partially correct, but, as has been said in chapter II, here by interface is meant a narrower field and not simply "what is in between" (which would risk leading to a *regressus ad infinitum*). We mean, instead, the human-machine interface as a technical mode of relation between the human component and the machine component, instantiated by a material portion of the medium. The medium, though, must be regarded as one of the agents in the relationship that is being considered, with its own position and its own way of acting and retroacting.

85 N. Wiener, *Some Moral and Technical Consequences of Automation. As machines learn they may develop unforeseen strategies at rates that baffle their programmers*, in «Science», vol. 131, 6 May 1960, pp. 1355-1358: 1357.

> of its operations may be. This is highly relevant to *the problem of our being able to foresee undesired consequences* outside the frame of the strategy of the game while the machine is still in action and while intervention on our part may prevent the occurrence of these consequences. Here it is necessary to realize that *human action is a feedback action*. To avoid a disastrous consequence, it is not enough that some action on our part should be sufficient to change the course of the machine, because *it is quite possible that we lack information on which to base consideration of such an action*[86].

In this passage, the author states the link between information and action, as seen above, and that, in order to achieve genuine medial interaction, there must be equal access to information, which is liable to become difficult on the human side. The task of balancing the conditions of access to information of a human being and a medium may even be impossible, since human beings and machines work on two different time scales[87]. Yet even the simple awareness of this difference – and the consequent elaboration of strategies of interaction that take it into account – can already be considered part of the undertaking of the technical culture.

Wiener, therefore, marks a difference between the human component and the machine component, which operate in a different and, sometimes, not commensurable way. Simondon, on the other hand, stresses the elements of continuity between these different agents in the system. According to the French author, this continuity can be seen in the common origin of human thought and technicality, as well as in the *isodynamism* of machine and thought. Isodynamism is something other than isomorphy and does not in any way imply a commonality in time scales. Rather, by this term we mean that both paths, starting from a common origin - i.e. the mechanism of invention - develop according to analogous dynamic laws and, therefore, benefit from a certain translatability and, consequently, the possibility of reconstructing or tracing back one of the two paths in the language of the other. Invention, in fact, is not only the act that originates a machine, but also the origin of thought itself: before any form of logic, thought, in Simondonian theory, is born from an *intuition* understood as the *discovery of the resolution of a problematic order*. Even knowledge in general develops with the same method and, in particular, technical knowledge deals with the *intuitive rediscovery* of the functional schemes that underlie each ensemble, individual or technical element.

Simondon's concept of technical culture, therefore, also corresponds to a rediscovery of co-originality and isodynamism. But it was just said that also the thematization of the scalar difference theorized by Wiener could represent an important integration to the technical culture. But despite their immediate appearance, the facts are not contradictory. Difference and compatibility (translatability) are both necessary for there to be interaction understood as the resolution of a problematic order in the direction of a metastable equilibrium. In other words, the technical culture must work on the interface level, where the interaction takes place and the friction between scalar difference and isodynamism can become productive.

Technical culture serves to understand the common origin of human reason and technicality and, above all, to include the connection with and within technology in terms of

86 *Ibid.*, p. 1357, italic mine.
87 Cf. *ibid.*, p. 1358.

relationship. However, it is important to be careful in adhering to this perspective: one must not think that technology is neutral. The lack of technical culture does not only depend on a more or less guilty ignorance on the part of the human component, but can be facilitated by machines and their influence on perception, cognition and action.

The active role of the machine in the breakdown of the relationship with the human component is identified and, perhaps, exasperated by more catastrophic authors. Among them, the most systematic example is that of Günther Anders. Anders characterizes technology as a real subject of history[88], which proceeds and acts in accordance with a sort of veritable *categorical imperative*.

The Andersian technical imperative is based on a characteristic of technical objects and ensembles that Simondon somehow identifies, but considers, in a certain sense, an advantage for the human being and for its freedom of action: *hypertelia*[89]. If, according to Simondonian theory, hypertelia puts technical individualization at risk, leading to disadaptation (and therefore requires the inclusion of the human component in the associated *milieu*), according to Anders this tendency – which aims at a single purpose (which is the growth of the apparatus) – cannot stop, given the ability of the apparatus to include the environment in its operation, and will lead to the discovery of new technical possibilities which will be realized, by virtue of the imperative "what *can* be done *must* be done"[90]. According to the Silesian author, every current moral imperative comes from technology and mainly says that the *possible* must be accepted and applied as *mandatory*, as a *duty*; and what must be done is *unavoidable*, must find an application.

According to techno-pessimistic theory, humans cannot be free about decisions concerning technology: linear conditioning is neither reversible nor avoidable. The imperative of technology guides and conditions any other decision, economic or political. This view is obviously partial, since it does not consider the role of the human component in the circulation of information. In particular, it does not seem to take into account the fact that information is a kind of action and that information and action can be conveyed, in a bidirectional way, by the same medium.

However, despite its limits, this perspective captures an important point: *linear conditioning is inevitable, or, at least, is inevitable on a small scale, even when it is only a segment of a larger circular causality*.

On the one hand, therefore, we have a perspective that attributes to the lack

88 The subjectivity that Anders assigns to technology is very similar to the role of agents with which we are trying here to describe media and machine components of a medial system; however, the tendency of the German philosopher is still to "anthropomorphize" these subjectivities, assigning them a, albeit metaphorical, *will to power* (cf. G. Anders, *Die Antiquiertheit des Menschen II*, cit., p. 117).

89 With the term "hypertelia" the French philosopher indicates a hyper-specialization of technical objects, which, if separated from their own context of invention, could "disadapt". As much as they may contain margin of indetermination, they will always be linked to a finite range of possibilities of use and will therefore risk fractioning or losing their autonomy if transported to an environment other than that for which they were designed (cf. G. Simondon, *Du mode d'existence des objets techniques*, cit., pp. 61-69).

90 Cf. G. Anders, *Die Antiquiertheit des Menschen II*, cit., pp. 17 ff.

(on the part of the human being) of technical culture the problems of interaction; on the other hand, there is a theory according to which technology is a subject oriented to the domain and according to which it is thus the one that brings the human component out of the medial condition. In both cases the problem consists in the cancellation of the human will at the expense of the linear proceeding and of the binary and deductive logic of the machines. Whether it is human ignorance or machine conditioning, the issue lies in merely observing the blind and linear causality of the technological components (and submitting to it), rather than observing the system and its circular causality.

However, the causes of these problems, *moral* or *ethical* in the broadest sense (in the sense of problems of practical philosophy), never reside exclusively on the human or machine side: they are *interface* problems. It is in fact a lack of full and conscious interaction between the two components. But by "interface problems" it should not be assumed that the interfaces do not work well: the knot here is that they work tending to hide rather than reveal the interaction.

The combination of human responsibility and machine responsibility[91] emerges from a careful observation of the dynamics of interface design: the underlying technical choices condition the possibilities of application in interface design, which, as we will see, is "ideologically flawed"; but the decision to continue to simplify interfaces so as to make them increasingly self-evident and to limit experimentation – adapting human beings as much as possible to the logic of the machine without letting them understand it – contributes to perpetuating the ideological flaw.

Why does the interface work like this? What are the origins and conditions of ideological flaw? Before answering these questions, it is necessary to digress into this particular field of investigation, which will constitute one of the branches of philosophy as mediology.

4. Mediopolitics.

The field of analysis called into question is that of *politics*, understood in a very general philosophical sense: it is the space of individual and collective action, of the structuring of bonds and interactions and of the dynamics of power and control. This field inevitably also involves the role, the action, the ownership, and the use of media, as well as mediation processes. Also the operations that concern the *control* of the bodies or of the link perception-(sub)cognition-action pass through a

91 The term "responsibility" is inherently ambiguous and, in philosophy, is linked to the concept of *moral agency* and, consequently, to that of *free will*. This also gives rise to the concept of legal responsibility, which defines individuals or collective entities as responsible (and also punishable) when confronted with rules and laws. In common perception, therefore, the concept of responsibility is essentially human and difficult to extend to machines, particularly if they are not intelligent machines. However, legal responsibility already confronts us with the fact that it is not only individual human entities that are responsible, but also collective or abstract entities such as a company. Well, if this concept is taken to its extreme consequences, it will not be impossible to make non-human and machine entities fall into the category of responsibility. For this to be accepted, a redefinition of the notion of action, a de-anthropologization of the notion of agent, and a replacement of the theory of moral agency with a theory of action in the light of the notion of information will be necessary. This will be discussed *infra*, pp. 160 ff.

regulation of the *access* to the condition of mediality.

The very issue of control and interaction between human physiology and the machine component of a system is, as we have seen, an interface issue. Yet we have talked about it as an *aesthetic* problem, albeit in a perceptological sense; what, then, is the *political* value of all that?

First and foremost, it must be noted that there is a very close link between aesthetics and politics, and this has been very well discussed, among others, by Rancière[92]. For the French author, in fact, what initially connects aesthetics and politics is the fact that both represent forms of *partition of the sensible*. He calls «the partition of the sensible the system of self-evident facts of sense perception that simultaneously discloses the existence of something in common and the delimitations that define the respective parts and positions within it»[93]. This partition is to be understood in a Kantian sense – albeit historicized, *à la* Foucault – as an *a priori* form of what we are given to perceive[94] and on which, consequently, we are given to act. The partition is therefore, in a certain sense, pre-political and pre-aesthetic and is a condition of possibility for both aesthetic[95] and political practices, since «[p]olitics revolves around what is seen and what can be said about it, around who has the ability to see and the talent to speak, around the properties of spaces and the possibilities of time»[96]. In other words, this aesthetic-political partition described by Rancière corresponds to the more general definition of interface.

In the interface "pure art" and "applied art" – that is the aesthetic-visual element and the operative one – intersect[97], which makes it not only an *object* of political analysis, but also a *point of encounter* of political issues and dynamics. After all, as Alexander Galloway points out – resuming a suggestion by Wendy Chun[98] – the software interface (and, I would add, the interface in general) is "an analog" of the ideology "that is functional"[99]. This ideological character, which will be discussed in more detail in the next section, is expressed in particular in the "determinism narrative"[100] of digital technologies and in the double mechanism, once again related to the partition of the sensible, of *reflection* and *obfuscation*[101].

But the political relevance of the interface is not only evident from its link with the partition of the sensible: in fact, it is not only a condition of possibility for politics, but also a fundamental vector of human and mechanical action, with its

92 The text to which I will refer is J. Rancière, *The Politics of Aesthetics. The Distribution of the Sensible*, tr. G. Rockhill, Bloomsbury, London-New York 2013. In some passages – directly quoted or referred to – Rockhill's translation will be slightly modified: in particular, I prefer to use the term "partition" to render more literally the French word "*partage*" (thus maintaining also the nuance that carries both the concept of division "in parts" and that of the assignment of a "part", in the sense of a position), rather than "distribution".

93 *Ibid.*, p. 12.

94 Cf. *ibid.*, p. 13.

95 Cf. *ibid.*, p. 14.

96 *Ibid.*, p. 14.

97 Cf. *ibid.*, pp. 20-21.

98 Cf. W.H.K. Chun, *On Software*, cit., pp. 26-51.

99 Cf. A.R. Galloway, *The Interface Effect*, cit., pp. 54 ff.

100 Cf. *ibid.*, p. 69.

101 Cf. *ibid.*, p. 64.

important influence on individual and social ethical-political dynamics.

As mentioned above, there is a very close link between perception – influenced by media interfaces – and preparation for action. The predisposition of an individual to certain types of action and the preclusion of others is inserted in collective contexts and conveys the formation (or impediment) of certain types of collectives, according to certain paths of individuation. In addition, the conditioning of individual human components, especially if standardized, affects social, economic, and political dynamics.

All of this has already been discussed *supra* and an attempt has been made to analyze the mechanisms by which this is done. What remains now is to highlight the eminently political *effect* of all this.

Inasmuch as it conditions, the power of the interface is political power and its effects are therefore political. Moreover, this power is much more effective and pervasive than any institutional political power, since the power of the interface is *concealed* and is therefore *undisputed*, precisely in the sense that it is *neither disputed nor disputable*[102]. The power of interfaces can be identified with what Byung-Chul Han calls "smart power", a power that seduces and entices, that aims not to make human docile, but rather to make it dependent[103].

However, Han argues that bodily subjection to the dynamics of power, i.e. training, is typical of a previous state of capitalism[104], while what would happen today, in the age of big data, would be more a psychic subjection, a *psychoprogram* (individual, collective, and of the unconscious)[105] different from that of *biopolitics*. Actually, as it has been tried to prove, even in the context of the apparatus of digital and computer technologies, body training is not extraneous at all: it takes place mainly through interface and acts first of all on perception, but also has effects on posture[106] and on different bodily aspects.

102«Wherever power does not come into view at all, it exists without question. The greater power is, the more quietly it works. It just happens: it has no need to draw attention to itself» (B.-C. Han, *Psychopolitics. Neoliberalism and New Technologies of Power*, tr. E. Butler, Verso, London-New York 2017, p. 13).

103Cf. *ibid.*, pp. 13-15.

104Foucault already realizes, after writing *Discipline and Punish*, the fact that society contemporary to him differed in several respects from the disciplinary one he described in that book; however, the French philosopher remained convinced of the goodness of the *biopolitical* paradigm: he could only have solved the problems underlying the dynamics of power by tracing the origins of biopolitics in its link with the concept of *population* and in the context of the government regime in which it was necessary to problematize the issue of the administration of the "population phenomenon" – in apparent contradiction with the attention paid to the «respect for legal subjects and individual free enterprise» (M. Foucault, *The Birth of Biopolitics. Lectures at the Collège de France 1978-79*, tr. G. Burchell, Palgrave Macmillan, London-New York 2008, p. 317) –, i.e. *liberalism* (cf. *ibid.*, pp. 21-22). Liberalism, according to Foucault, exalts individual freedom because it is a regime that *needs* freedom: it *produces* it in order to *consume* it (cf. *ibid.*, p. 63). This has two fundamental consequences: the first is the birth of an economic knowledge disconnected from the art of government (freedom is produced in the economic system, not necessarily in the political system), to which the sovereign power has to adapt (cf. *ibid.*, pp. 285-286); the second is «the considerable extension of procedures of control, constraint, and coercion which are something like the counterpart and counterweights of different freedoms» (*ibid.*, p. 67). Han, for his part, as will be said, argues the insufficiency of the Foucaultian category of biopolitics.

105Cf. B.-C. Han, *Psychopolitics*, cit., p. 21.

106Despite the apparent "disappearance of the body", what has been happening since the use of the

It should also be considered that, since the interface establishes the boundary and the relationship between what can be acted upon and what cannot be acted upon, its biopolitical effects remain important. If we understand biopolitics not simply as the politics that addresses life as an object, nor as the theory that the "world of life" or "nature" is the normative basis of politics, but as «the administration and regulation of life processes on the level of population»[107], then media and interfaces play a major biopolitical role: they, while acting on individuals, produce a standardization effect and therefore not only extrapolate from the population data that can be statistically analyzed, but contribute to creating or replicating the population itself.

Although it is certainly true that digital power acts on the cognitive level, it is also true that this action takes place through physical-sensorial channels and starts from physical media. Yet the anti-physicalist prejudice seems to be quite rooted even in those authors who very acutely identify the power dynamics underlying the question of the interface. Even the already mentioned Rancière, for example, argues that from the technical properties of a medium cannot derive aesthetic properties[108]. What we want to say here is exactly the opposite thesis: the interface is the springing of aesthetic and political practices, but the format of the interface – and therefore the portions of reality on which both experience and action become possible – changes depending on the techniques and supports that instantiate it. In other words, it is the media and their interfaces that decide access to politics.

The political question concerning interfaces, therefore, regards both the precondition of any politics, and the analysis of the causes of the non-recognition of a mutual action between different components of the system[109]. It is then in the political field that the question of access or exit from the medial condition is played out. It is not, thus, simply a question of biopolitics, psychopolitics, technological politics, but of *political theory of mediation*. We will call this area of investigation *mediopolitics*.

This field of investigation will also include a number of issues that will revolve around intentional conditioning, operated by those who, knowing how to manage the mechanisms connected to the use of media, having the economic possibilities,

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first digital technologies is the assumption of a *posture*: starting from the "posture zero" (human-mouse-computer) – which is not really "zero", since it represents the first mainstream commercial fruition, certainly not the first absolute relationship between human beings and computers – up to its most modern evolutions, which however keep our gaze stuck to the screens, to their surrogates, or to their internalizations. These and other themes, although in a popular way and not always in accordance with what has been said and argued here, were discussed by the Italian novelist and essayist Alessandro Baricco in his book *The Game*, cit.

107T. Lemke, *Biopolitics. An Advanced Introduction*, tr. E.F. Trump, New York University Press, New York-London 2011, p. 4.

108Cf. J. Rancière, *The Politics of Aesthetics*, cit., pp. 46 ff.

109Similarly to what was said *supra* about biopolitics, what will shortly be defined as *mediopolitics* is to be understood neither as the politics that addresses media, nor as the politics that considers media as the foundation of any political action. On the one hand, it does not deny the historicity of the media apparatus, nor its relative autonomy and its logic of escalation; on the other hand, recognises the effect that media and interfaces have on the heart of political action and the political dynamics of media administration and governance, as well as the governance of individuals and population *through* the media.

and owning the infrastructure, *voluntarily* keep certain portions of users out of the condition of mediality; but, having to integrate in the political reflection also the actions operated by machinic and, in general, not human components, mediopolitics will also deal with the conditioning operated *involuntarily* by some components of the system on the others. In a nutshell, "mediopolitics" must be understood as both a critical theory of media policies and a general theory of the action of individuals and collectives within the medial system of reference.

In this research I will have to leave aside the analysis and the proposal of media policies, which goes beyond the theoretical and foundational purpose hereby suggested, while I will try to clarify what mediopolitics should be based on, i.e. a *theory of action*. On which elements this theory should stand and how it should guide the mediopolitical reflection will be the subject of section 6 of this chapter; for the moment, it is sufficient to say that it should also encompass non-human actions and the concepts of information and circular causality.

5. Ideological applications.

The main question with which a theory of mediopolitical action collides is: "*what brings the human component out of the medial condition, maximizing linear conditioning and minimizing the perception of circular causality*?"

The answer to the previous question is to be found in the *legacy* left by cybernetics in the design of digital media and their interfaces. This legacy, in fact, is not so much the theoretical one that, as has been observed, can instead help us to better frame the role of each component of the system in the logic of a non-circular determinism and that, indeed, assigns to the interface the main role in the mechanisms of exchange and reverberation of information; it's rather the practical one: the aim is to *maximize effectiveness*, since the system is faster and more efficient if the human component ignores its condition and merely performs its function.

The condition of technological stagnation, in fact, although closes the possibility of further and ever new technical individuations, can be functional to the efficiency of an already given system. This may well be for economic-social reasons, but the thesis defended here is that the current system, flawed by this only partial application of the cybernetic legacy, is the necessary product of a basic technical choice. A choice that will soon be defined as ideological.

Maximizing the effectiveness of the system involves an asymptotic adaptation of the speed of response of the human component, and therefore its linear training, strictly behavioristic, by the interfaces. The interface, therefore, must train the human component through a system of stimuli and rewards, so as to maintain a certain linearity in its action, while giving it the illusion of a multidirectional and hyper-spatial navigation. In this, media *automation* – which serves to «anticipate the automation of subjectivity»[110] – plays a fundamental role: media technologies anticipate our behavior, "predicting" it on the basis of standardizations of our *previous* behaviors, and signal us *deviances*. What happens, in the logic of the machine, is that it asks human components to adhere to their standardized version, since unpredictable behavior is an obstacle to perfect automation of the system; what is conveyed to the human components by the interfaces, in particular visual

110M. Andrejevic, *Automated Media*, Routledge, New York-London 2020, p. 2.

interfaces, takes the form of aids, useful warnings, perhaps even rewards and small gratifications (positive reinforcement)[111].

This is the training through stimuli and responses (which aims to generate responses of *low level networks*) that Günther Anders also thematizes in his description of the media system as *Reizmodell*[112]. It represents a partial vision that claims to be total and, therefore, an *ideology*, according to the definition as a *synecdochical regime* I gave of the latter in chapter III.

According to Žižek, ideology has the function of consoling against the supreme horror, that is, the *horror vacui*, the terror generated by the void. What really scares is «not the proverbial ghost in the machine, but the machine in the ghost: there is no plotting agent behind it, the machine just runs by itself, as a blind contingent device»[113]. In other words, the horror consists of *blind causality* that governs the elements of the system. As we have seen, in reality this causality is blind, linear, and unidirectional only at the level of the single elements, but it is transcended into a circular causality when a new level of system compatibility is discovered. Yet, concealing with an *ideological veil* the blind causality of the interface that aims to train us, seems to be more functional to the repetition of production, than an awareness of the cybernetic role of each component.

Ideologies, then, sometimes use a type of "minor" horror to mask the "major" horror (i.e. the void). It is no coincidence that the ideologies that have accompanied the birth and development of digital technologies are often associated with conspiracy theories: there are strong powers that control the world and mainstream media, but, through digital technologies, we could access the *truth in its entirety* and we could *do it ourselves*. These ideologies are that of *transparency* and that of *utility*.

The ideology of transparency is the one that *ignores the cut* operated by the interface, that does not consider the off-field. What the interface shows is a partial vision: it allows certain things to become visible (the computational elements are translated into a form that can be experienced by the human being), but, at the same time, it conditions vision, perception, attention, hiding, for example, the functional and operational elements, or in any case everything that remains outside the specific scopic regime created by it. Yet, despite this, digital interface tends to present itself as *a transparent totality*; it claims to show not a part, but the totality of being and to open to the world like no other medium had ever done before. It gives the impression of guaranteeing, on the one hand, access to the totality of information, while on the other hand, access to a virtual world at the complete disposal of the user. This has important consequences for epistemology and theory of action: on the one hand, the user believes that he or she can know everything about the so-called real world, while on the other hand he or she has the impression of acting only on a fictional world, thus feeling irresponsible in his or her own action. What is ignored, because of the ideology of transparency that influences interface design, is the *mediation process*: the impression is that of *immediate access* to

111Think about fitness apps or purchase tips provided according to previous purchases, or suggested tracks or videos on music listening apps or YouTube.

112Cf. *supra*, p. 97.

113S. Žižek, *The Plague of Fantasies*, Verso, London-New York 2008, p. 6.

both the real and the virtual world.

Another effect of the ideology of transparency is that it leads human components to respond to the presumed transparency of the interfaces with a self-denudiation, a putting in transparency of themselves. According to Han, in this manner, «Digital Big Brother outsources [surveillance] operations to inmates»[114]. This is the transition from the Benthamian panoptic to the digital panoptic, which does not operate with coercion, but exploiting voluntary self-illumination (*Selbstausleuchtung*) and self-exposure (*Selbstentblößung*). It should be noted, however, that even this monitoring of all on each one is only hypothetically unlimited and totally transparent: every self-illumination is a partial self-representation and every point of view, conditioned by the interfaces, excludes a portion of off-field. It is a *Monadengemeinschaft* more than a panoptic.

The ideology of utility, in turn, is that which mistakes one of the aspects of the interface, and of the machine in general, for its most proper and essential, if not unique, aspect. It considers *instrumentality* as the peculiar characteristic of the computer and its screen. In this way, media are not treated as media (i.e. as material objects with their own logical schematism, designed to carry out certain operations and to support mediation processes), but as mere tools, means, or middles. A medium has its own relative autonomy and its connection with the human component is a *relationship*, which is expressed by activating a *process of mediation*. Here we have an *ignorance of the medium*, i.e. the ignorance of any effect it has on us, to focus only on what we use it for or believe we use it for. All this gives us the illusion of using a pure means, of simply crossing a door or a threshold, while we do not notice the modifications that the medium induces in us.

What here is called "ideologies", for some may simply represent a positive evolution of interface design in the direction of greater usability. According to Trogemann et. al., for example, «in the early years of computing the user was the slave of the machine, who had to learn its cryptic command languages», while today programmers and designers «try to adapt the machines and to teach the interfaces human communication skills»[115]. If before, in the history of design, the interface was conceived as the medium between humans and computers, today it is identified with the computer itself, *through* which we act on the world[116]. But the thesis here proposed is that this way of increasing usability and ease of access to the functions offered by computers is only *one* of the possible ways; moreover, it is an ideological method that sacrifices, in the name of user-friendly interfaces, the awareness of the role of *media* and *mediation*, thus precluding the human component from accessing the condition of *mediality*. In order to maximize efficiency, the human component ends up being placed under the power of media, thus making it susceptible to the influences unintentionally operated by the machine or deliberately operated by those who know how to master its mechanisms.

The problems associated with the ideologies of transparency and utility are

114B.-C. Han, *Psychopolitics*, cit., p. 9.

115G. Trogemann, J. Viehoff, A. Roch, *Interfaces and Errors*, in H. Diebner, T. Druckrey, P. Weibel (eds.), *Sciences of the Interface*, Proceedings of the International Symposium at the Center for Art and Media - Karlsruhe, Genista, Tübingen, 2001, pp. 96 -110: 97.

116Cf. *ibid.*

manifold, but what must be asked first of all is whether these ideologies are produced by a coherent and necessary development of digital technologies (and therefore have a technical basis), or whether they are imposed from outside.

In the mainly techno-materialist perspective assumed up to now, the second hypothesis can be coherently discarded, or at least it can be said with a certain degree of certainty that an external ideology, extraneous to the machinic logic, could never have been imposed without resistance within a process of technological individuation.

Considering, instead, the process just mentioned, we could say that from the fundamental binary architecture of digital, from that first crystallization of technical gesture that was the decision to encapsulate in silicon the two-value logic of Aristotelian derivation, all the choices of contemporary hardware and software design have been derived, by escalation. Even the *graphic choices*[117], designed in digital and for digital screens, have their origin in the basic technical choice. The development path followed by this escalation, today, makes digital technologies vulnerable to other logics that aim to exploit them, as well as the economic one, but the fundamental point is the fact that are not these other logics to impose ideological choices, but it is rather the medial system, ideologically flawed, to allow the intrusion of these logics.

As said, therefore, to lead us to this result was the escalation of the technical apparatus. But one thing must be borne in mind: linear causality belongs to the individual components (with particular reference to the technical elements, since for individuals this already does not apply), but certainly not to a system and its complexity. It has been said, in fact, that the internal purpose of technical objects must always be understood in the plural and subjected to a transductive process that, on the basis of the resolution of conflicts of compatibility, can actualize certain choices to the detriment of others. The escalation that has led us from *the first digital choice* to the current ideologically flawed interfaces *is therefore only one of the possible tracks*.

This means that, by reconstructing the route backwards, through an appropriate archaeology of digital media, it will be possible to identify the points and junctions where a plurality of possible paths has been reduced to one. The task of a philosophical-mediological analysis will be to question the existing medial system and try, if possible, to imagine a different one.

An alternative is, instead, to understand if, at the point in which we are now, despite those ideological aspects, it is possible to have a "digital conscience" on an epistemological level, which integrates the procedural "digital competences".

117Considering the preponderant role that visual interfaces have in capturing and directing attention and, therefore, in conditioning human behavior, and also that the cultural technique of interface has always had, in all its implementations, a tendency to disguise itself, one would be tempted to shift the responsibility at least of the ideology of transparency onto the *visual nature* of the human-computer interface, rather than on the digital one. However, it is not from the visual element itself that conditioning derives, since the addition of a phenomenologically comprehensible element for the human component within the interaction, as we have seen, plays an important role and opens up new possibilities of individuation. Moreover, the success of the dissimulation of the visual interface in digital media is given by the possibilities opened by digital screens.

6. A new theory of action.

The first step, necessary from a theoretical point of view, to move in the direction of an awareness of the role of each component of a medial system, and therefore in the direction of a dismantling of the ideologies that trap the human component in a condition of exchange without interaction, is that consisting in the elaboration of a new *theory of action*.

To talk about a theory of action in a complex medial system we must immediately clarify the conceptual background: the background of such a theory can be neither that of a substantialist paradigm according to which individuals pre-exist to interaction, nor a model according to which individuals represent simple instances of supra-individual symbolic orders. In fact, it will be necessary to take into account the peculiar laws of individuation that regulate the development of different human, non-human, machine actors; of the different scenarios, real or symbolic, within which the actors act; of the laws governing interactions, how such interactions affect individuals; how systems do the same to their parts; how some properties only emerge from systems and not from unrelated individuals.

The theory of action that can provide the basis for ours could therefore be that of Mead. His social behaviorism, in fact, tries to account for both those acts that derive from primary stimuli and immediate responses – such as in unreflected (human and non-human) animal actions , but also in mechanical systems – as well as deferred acts[118], in which processing time allows a selection between stimuli and a choice between possible responses – as happens for many actions of conscious agents, or for those performed by digital systems.

Moreover, by including the beginning of the act (and thus the stimulus as well as the attitudes) in the act itself[119], Mead allows us to consider the conditioning of one component on another not as an imposition, but rather as an appropriation by an individual of the stimuli deriving from its environment or from its interaction with other individuals.

Although Mead accepts the idea of an individual mind, at least in terms of an intelligence that selects stimuli[120] and memory, placing the roots of these and other functions in the central nervous system[121], he considers it a product (nervous system as power, mind as act) of social interactions[122]. This allows the theory of action to be based on the transmission of informative meanings through the structuring of collectives.

The collective is, in fact, what allows communication, understood as the transmission of meanings through information. «The existence of a collective - writes Simondon – is necessary for an information to be meaningful»[123]. This is because receiving information means undertaking an individuation, that is «creating a collective relationship with the being from which the signal comes»[124].

118Cf. G.H. Mead, *Mind, Self, and Society*, cit., pp. 90 ff.

119Cf. *ibid.*, p. 5.

120Selection is also considered a behavior.

121Cf. *ibid.*, pp. 98 and 116. In a sense, Mead considers the CNS as a *potential* and the mind as an *act*.

122Cf. *ibid.*, p. 7.

123G. Simondon, *L'individuation à la lumière des notions de forme et d'information*, cit., p. 298, my translation.

124*Ibid.*, p. 298, my translation.

In this perspective, communication and structuring information are inseparable from action and, in particular, from transindividual action, which «makes individuals exist together as the elements of a system that carries within itself potential and metastability, expectation and tension, then the discovery of a structure and a functional organization that integrate and solve the problem of immanence that it contains»[125].

Thanks to this importance attached to the collective, we can take proper account not only of individual unidirectional actions, but we must also give due importance to *inter*actions, namely multi-directional exchanges that create emerging group behavior, new types of training and learning, and networks of relationships.

By expanding the notion of collective in a cybernetic direction, we can include media and machine components, mechanical environments, natural environments, digital environments and thus define the background and conditions necessary for action within the medial system. In this context, move those agents who receive stimuli, elaborate them, select them, provide answers, retroact on the source of the stimuli, generate interactions, exchanges and mutual conditioning with other agents. These actions, interactions, and conditioning are all based on exchanges of information. It can therefore be said that action must be understood as information and must always be contextualized, that is, based on a collective or a system, and located in it.

In this theory both human and non-human individuals can be considered as agents, without the main characteristics of the action changing. In fact, in the pattern that leads from stimuli to acts, what changes between human and non-human agents is only the sort of selection process. Both the human mind and a computer "choose": the second following a strictly binary logic, the first with different mechanisms[126]. It will be important to take into account these differences in "architecture" to understand that each component makes its choices on a different basis and according to different time scales, but it should not be forgotten the interface, which represents a the technique that enables the communication of different orders and therefore the creation of cybernetic knots between human, mechanical and digital components.

With regard to contexts or environments in which actions must necessarily take place, the theory of action in the light of the notions of feedback and information must take into account both the so-called real ones and the virtual or fictional ones. As far as *virtual* environments are concerned, as already mentioned in the previous chapter, they are not causally closed compared to the "real world": the nature of the computer medium is rooted in the materiality of hardware and of signals, discretized in impulses, mathematically encoded and therefore made manipulable and programmable according to logical rules. This means that events that take place in a virtual environment are not reducible to mere matter of communication, but respond to the laws of information and of an operational and

125*Ibid.*, p. 294, my translation.

126For a theory that considers the human mind as not entirely simulable by a computer, as it is based on ultimately non-deterministic processes, see R. Cicurel, M.A.L. Nicolelis, *The Relativistic Brain*, cit.

procedural ontology, which determine courses of action, as well as human position in such courses.

While virtual environments, as mentioned above, also fit into the materiality of the real world, we can easily recognize that not all environments have *direct* effects on physical reality, as they are fictional environments. One might therefore think that in such contexts a theory of action based on stimuli, selection processes, responses and observable behaviour might not be suitable for a context in which no real action takes place. Here the problem lies in deciding whether fictions can also be defined as "acts". Since even a fictitious construction implies a process of invention or copy, of selection between alternatives, and of composition and recomposition, it actually obeys procedural laws very similar, if not identical, to those that regulate the so-called real acts. Not only that: whether or not they are implemented by digital media, fictions differ from acts only in context and quality of effects. A prejudice to be dismantled is precisely that according to which "pretending" is tantamount to deceiving[127]: «To pretend is not to put forth illusions but to elaborate intelligible structures»[128], which obey a causal logic and constitute a concatenation of acts.

It has been seen, therefore, as a *theory of the action* of Meadian derivation hybridized with the notions of *cybernetics* and which identifies the action with a *finalized behavior*, that is the *transmission of information* in order to solve problems of compatibility and to create metastable balances can include and explain both human and machine action, both in real and virtual physical contexts.

This theory of action provides the means to address the problems posed by mediopolitics. More: it is a theory of mediopolitical action, meaning by "mediopolitical action" the action (which is transmission of information) of the media, on the media, through the media, in the context of a medial situation. This theory allows to frame actions, reactions and conditioning in the light of the concepts of cybernetics and can, therefore, dismantle, at least from a theoretical point of view, the influence of the ideologies of transparency and of utility. However, it will also have to indicate which behaviors favor the entrance into the medial condition and its maintenance, and should therefore inspire both suggestions for new practical cybernetic applications and pedagogical theories aimed at access to the condition of mediality.

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After having established that visual interfaces condition human perception and that they have, as a consequence, an important influence on the predisposition to action, in this chapter we have seen how this conditioning is functional to the optimization of a medial system, since it is a type of learning: it teaches the human being to correctly interact with a machine to pursue purposes through it.

The conditioning, however, should give rise to a feedback, which allows the machine to regulate itself, also in favor of the human being and the environment,

127One could also argue, in reality, that creating illusions – i.e. producing effects by processing stimuli so that they become stimuli for other individuals – does not correspond to an activity.

128J. Rancière, *The Politics of Aesthetics*, cit., p. 56.

and allows the continuous experimentation of the human being on the medium. Such a situation would be that of an optimal interface, where exchange and interaction are the norm.

The rules that govern such a system are those of cybernetics, but the interface does not always manage to maintain its role as a double direction cybernetic hub. It is precisely from this order of interface problems that philosophical mediology moves.

It will consist mainly of two disciplines, the first of which will be *techno-aesthetics*, which is assigned the task of studying the media in the light of their action through human perceptual channels and their mechanisms for translating computational data into different phenomenological expressions. In other words, it studies the interfaces from a perceptological point of view.

The second discipline, which has been the subject of this chapter, is the *cybernetic theory of action*, or *theory of mediopolitical action*, which deals with framing motivations, contexts, effects of actions aimed at creating a medial system, carried out by human as well as non-human actors.

However, mediopolitics, by virtue of its cybernetic inspiration, cannot stop at this theoretical work, but must be theory and *praxis* together. Practices and tools must therefore be developed in order to facilitate awareness of the functioning of the system, without however sacrificing its functionality, favoring the entrance into the optimal medial condition.

Conclusion, or: What is to be done?

The entry into an optimal medial condition requires that the medial system is characterized as a transindividual entity: a network of connections in which systemic and supraindividual properties develop, but in which no individuality, be it technical or natural, is sacrificed. That is why the worst enemy of optimal medial condition is *disindividuation*.

The risks of disindividuation, as we have seen, arise due to bad interaction between human beings and the media and are therefore essentially *interface problems*. They are configured as dynamics of cognitive exploitation of human components by machinery. This obviously benefits the linear continuation of machines' inner purpose, but it is also exploited by those who take advantage of the dominant interfaces to master other components, extracting data, time, and attention for commercial or political purposes.

But the risks of disindividuation are not limited to this. If the risk indicated above corresponds to *collective disindividuation*, there are also risks associated with *psychic disindividuation*, e.g., the stiffening of identity and beliefs, the misrecognition of the otherness, and the reduction of empathetic skills[1].

The solution to this kind of problems cannot be found in the "ethics *of* communication" that ignores the *technical specifics* of the computer-mediated communication. On the other hand, since virtual environments are not completely separate social contexts, not even the "ethics *in* communication" can help.

Such problems are undoubtedly ethical problems, but what has been tried to achieve in this research was to give a solid theoretical mediological foundation for an information ethics that can address, on a case-by-case basis, specific instances of the problems mentioned above.

The proposed theoretical approach aims to give causal explanations of these problems and to propose, for their solution, a restructuring of the conceptual framework. The first order of causes concerns what I have called *ignorance of the medium*, or *ideology of utility*: the emergence of violent behavior or closure is not only connected to the violation of communication standards, but also to the fact that too often we forget the *signifiers*. Mass digital culture is a paradoxical condition of ease in an environment saturated in digital media, often ignoring their mechanisms and functioning and treating them, at best, just as useful tools. In this condition, we are driven to shift our attention from the signifiers (that, in fact, guide and condition our way of understanding, acting, and communicating) to the exclusively semiotic field, that of meanings. In our *present culture*, the signifiers are those means and material supports through which digital communication takes place: in other words, *digital media*.

The second cause is what I call *decline in hermeneutic attention*: because of the speed of communication it is easy to lose the sense of the frame and, consequently, the impression of immediacy replaces the awareness of mediation; less attention is

1 Cf. S. Turkle, *Reclaiming Conversation. The Power of Talk in a Digital Age*, Penguin, New York 2015.

given to mediated messages that would require careful interpretation. This has to do with *ignorance of mediation*, and therefore with the *ideology of transparency*.

Once these causes have been identified, philosophy as mediology can help to place them on a new horizon. *Techno-aesthetics* makes it possible to become aware of the conditioning that the media, through interfaces, exert on other components of the system and, in particular, on human ones. The *theory of mediopolitical action* makes it possible to frame these conditionings in a systemic perspective, to identify their counterparts of such conditionings in the human feedback, and to reconceive the role of each component according to the emerging properties of the medial systems.

The cooperation of these two branches of philosophical mediology can unmask these interface errors, now engraved in the design of contemporary dominant interfaces, can indicate them as causes of the closure of some components to the medial condition, can try to point the way to minimize the risks of bad interaction, moving in the direction of an *optimal condition*.

But in order to aspire to an optimal medial condition, as many interactions within a medial system as possible must take place in an optimal way. And, if the ideologies of transparency and utility spoil the current interface design, it will then be necessary to intervene technically and practically on the design, so that any user can have an flawless relationship with the media and any other element of the medial system.

1. Awareness.

The first step in the direction of dismantling linear conditioning, in view of the recovery of a safe interaction between the parts, is to regain awareness of the interaction itself, and therefore of the reciprocal conditioning. In other words, it is necessary to recover the *awareness of the interface*.

The basic question, then, is: *how* this awareness of the interface can be recovered? This means asking how, on the one hand, it is possible to recover awareness of the *otherness* between the human component and the machine component, and, on the other hand, how it is possible to recover the *sense of interaction*, understood as the discovery of a *new order of compatibility* between components of the same cybernetic system.

First of all, it is necessary to distinguish two ways of recovering this awareness: a *traumatic* one and an *intentional* one. The traumatic one is given – especially in visual interactions – by *temporal irritations*, *glitches*, *bugs* in programming codes, or *crashes*.

There is talk of *temporal irritations* when the time difference between the machine and the human component becomes too evident. Normally interfaces are designed in order to avoid the awareness of the different time scales of media and humans, but interfaces could fail.

The *glitches* are short and sudden peaks in a waveform, caused by an unpredictable error. In visual interfaces they appear as graphical display errors that can cause annoying effects and prevent successful interaction, or can inadvertently reveal portions of source code.

Bugs are errors in writing the source code, which cause the software to fail or

produce unexpected results. Typically they can be syntax errors, logical (or semantic) errors, or runtime errors; each type of error will cause different visual irritations in a visual interface or real logical errors in the calculation phases.

Crashes are temporary blockages of a program or a system, caused by software or hardware problems or by actual *interface errors*, i.e. temporary and non-repetitive errors in the communication of different elements of the system.

In all these cases, what suddenly becomes evident is the *extraneousness* of medial objects. To use heideggerian terms, when we lose the "handiness" (*die Zuhandenheit*), the usability, when a usable (*Zuhandene*) becomes unusable (*Unzuhandene*), when it looks like a mere object (*Vorhandene*), only then do we really become aware of it: «in a disturbance of reference – in being unusable for... – the reference becomes explicit»[2]. This, applied to the interface, means that, during a malfunction, the interface shows its medial nature, that is to say of *reference* (a phenomenal experience that *refers* to a computational nature, for example), thus momentarily dismantling the deception perpetrated by the ideology of transparency.

These "traumas" give us a *momentary* account of the objectual, different, somewhat extraneous character of the computer object, but they are precisely considered *errors*, malfunctions, things that should *not* happen and should *not* be repeated. The contemporary design of visual interfaces, in fact, aims to *minimize* such traumatic events. For an awareness that is long-lasting and that does not sacrifice usability, different strategies need to be developed.

2. Medial education.

If the first step is to generate awareness, but if trauma is not enough, we need to think about how to instill in as many users as possible the critical capacity – which can be summed up in a mastery of the rudiments of techno-aesthetics and the theory of mediopolitical action – necessary to question design ideologies, or at least to treat traumatic events generated by interfaces as opportunities for reflection on their nature.

In order to be able to assume its *public function*, mediology must move from academic discussion to *general culture* and must be able to influence public debate and consequent policies. In particular, it should be able to implement a call for a *medial education* since the very first years of school.

This medial education should include a technical component and a critical one, so as to prepare the ground for mediological consciences that are able to always pursue the optimal medial condition when approaching systemic interaction. It will have to incorporate the analysis of algorithms underlying computation, the understanding of the micro-archival temporal regime, and the understanding of the physical nature of bits and of digital phenomena rooted in the continuous analog, as well as elements of criticism, deconstruction, and interpretation.

However, we must be honest on one point: it is by no means certain that mere awareness leads to access to an optimal medial condition. The formation of conscious users, the awakening of medial educated consciences does not

2 M. Heidegger, *Being and Time*, cit., p. 70.

automatically affect the material conditions of mediation.

Through this educational process it is even possible to achieve unexpected and undesirable results. One of these could be that for which conditioning and, above all, ideologies are *accepted* once explained. After a period of accommodation, the user will consider himself superior to ideologies just by being aware of them, and this will be enough and will result in sluggish acceptance.

Simply educating users to unmask what lies behind the interfaces, in other words, *is not enough on its own* to dismantle the ideological system that supports them today. This is because, ultimately, medial education would end up minimizing and quenching the effect of trauma, which would be rationalized. Although the process is different, the result of medial education (the minimization of trauma) would be identical to that of ideological design.

This does not mean, of course, that medial education is not to be pursued. As said, in fact, the acquisition of interface awareness is a first and fundamental step towards an optimal medial condition. But it remains, precisely, only the *first* step. It is also necessary to give a direction to such education: once the conditionings of the medial interfaces on the one hand and the human capacity for retroaction on the other hand are recognized, it will be possible to think that a different feedback and a different interaction will lead to a modification of the conditionings. If tearing down the conditionings is impossible, *redirecting* them shouldn't be.

A call to action is necessary: whoever, endowed with adequate awareness, wants to change the current ideological structure of the dominant interfaces, must then *act* on them.

3. Alternative design.

There are different ways to act on interfaces. Mainly we could distinguish two major categories of action: on software and on hardware. Acting on software is easier, since it is a question of modifying existing softwares or coding new ones, but starting from the current hardware architecture.

Considering the fact that, as I have tried to show in this work, the properties of the software emerge from and are limited by logical features already incorporated in the hardware, this strategy will probably only *partially* change the interaction of human components with the machine. However, it is also true that the current architecture does not have a single entelechy, but a plurality of entelechies[3] and therefore it is not necessarily impossible to find a software design capable of fostering a sense of interaction, based on the current technical *a priori* and the material supports of the existing interfaces.

3.1. Alternative software.

A first strategy could be that of *Theory of Bugging*, i.e. a creative bugging scheme, supported by open interfaces, that allows users to act directly on the code *during interactions* so as to introduce errors voluntarily. The basic idea of this theory is that advanced HCI should include «the creative skills of error, malfunctions and noise»[4]. Trogemann, Viehoff, and Roch maintain that source, destination and noise can

3 Cf. *supra*, p. 142.

4 G. Trogemann, J. Viehoff, A. Roch, *Interfaces and Errors*, cit., p. 96.

rotate in their position, so they propose a scheme in which «we assume that the observer, artist or user induces an error into the medium»[5].

The paper by the three scholars just mentioned also contains some practical suggestions for intentionally bugging current interfaces for artistic purposes, but also advocates the design of advanced interfaces which

> would have the task to mediate not only the selection procedure to the user, but also the mutation procedure. The observer would not be just a slave of random genetical evolution, but be more a genetical engineer in a kind of code laboratory that mutates and resynthesize the code dinamically[6].

Surely such interfaces would increase the sense of interaction and make the user's role active and exploratory. One wonders, however, if and how functional they can be outside of artistic or experimental contexts and how much they could maintain a certain degree of usability, even without making it their main purpose.

Another way for the user to help design interfaces while interacting with them, thus perceiving the moment of interaction and mediation, could be *participatory design*. Participatory design can be seen as an ideal counterbalance to user-centered design[7]: if the latter aims to create design solutions that take into account the points of view, needs, and expectations of users, making sure to create solutions as intuitive as possible[8], participatory design, on the other hand, wants the user itself to participate in the construction of the interfaces, personally introducing its own points of view and needs and thus merging the moments of design and use.

Thanks to a combination of open software and active user involvement, it is possible to include in the participatory design not only technical solution packages to choose from, but also «the whole social universe in which the application will function»[9]. It is no coincidence that this type of design is used primarily in the field of architecture and sustainability.

The fact that participatory design focuses more on the processes and procedures of design than on style has an advantage and a disadvantage: on the one hand it will foster a sense of interaction, the importance of feedback, and collaboration between human components and media components; on the other

5 *Ibid.*, p. 107.

6 *Ibid.*, p. 108.

7 Actually you could say that even the user-centered design itself should be de-ideologized. In fact, it is not in itself wrong to think of designing interfaces that meet the needs of users, but it must first be clear what these needs are. If one assumes that the first need is intuitiveness, then it will go in the direction of current ideological design; but if one assumes that the primary need is to establish and maintain a relationship of participatory mediation, then user-centered design could also be an *alternative* design strategy.

8 «Intuition means you get what you expect, nothing more.» (G. Trogemann, *Irritation versus Intuition. Notizen zur Situation der Informatik*, in R. Matzker, S. Zielinski (eds.), *Medienwissenschaft, Teil 5, Fiktion als Fakt, "Metaphysik" der neuen Medien, Jahrbuch für Internationale Germanistik, Reihe C, Band4/5*, Peter Lang, Bern 2000, pp. 45-59: 49, my translation). In this sense an intuitive interface does not favor productive mediation.

9 G. Trogemann, S. Göllner, L. Scherffig, *Unort-Kataster. An Urban Experiment Towards Participatory Media Development*, in U. Seifert, J.H. Kim, A. Moore (eds.), *Paradoxes of Interactivity*, cit., pp. 192-217: 195.

hand it risks being limited in design operations by stylistically limited *a priori*.

3.2. Alternative hardware.

If we want to intervene at the basis of design logic, however, in line with the techno-materialistic principles adopted in this research, it will be necessary to intervene on hardware logic. The screens, the visual interfaces (but also their connected or integrated haptic components) would seem to participate too much of the calculating and calculated matter underlying digital media. So the first question arises: what if optical nature is the problem? Could it be a solution to prefer other types of interfaces?

As I have already said[10], for the moment, very often the other interfaces, acoustic or haptic as they may be, are now designed mainly according to visual elements. Even the increasingly widespread acoustic and vocal interfaces (e.g. vocal assistants) often integrate visual or light elements, at least to signal whether they are on or off, and also interact with optical technologies. But, regardless of the evident *resistance of the screens* as primary forms of our medial interaction and therefore of the objective difficulty we would have in abandoning them, we must ask ourselves: would eliminating the visual from our mediascape favor an awareness of the processes of mediation?

Actually, it would not seem to be the visual element itself to be a problem: the problem is rather the fact that the visual is used to completely exempt the user from the logical-computational part of the medium. The problem, in other words, is that the interface is used as if it were only a showing surface, which however must also hide the functioning of the medium – instead of letting it appear for what it is – i.e. a threshold of exchange and mediation. But the same concealment and exemption also occur with other types of interfaces: vocal assistants try to simulate the interaction between human individuals, so as to hide even more the fact of dealing with machines.

To obviate the obscuration of the logical-material and logical-computational components could be precisely the proposals of different software design suggested before. But perhaps the problematic point lies precisely in the fact that, even when aware of the different nature of the medium, one cannot necessarily expect the human component to adhere to the same machine logic. If the dominant interfaces are phenomenological manifestations that try to adapt as much as possible to human perceptive abilities - and this has an effect of alienation (automating the human being without making it aware of it) and of masking the basic difference - one cannot believe that the solution is the opposite: to move from the humanization of information technologies to the mathematization of human action.

But what if we try to bypass, or rather integrate the logic-computational components of machinery and human perceptual-sensory components with different *methods and materials* of interaction? If the interface has to create new compatibility orders, couldn't it use materials of a radically different nature than the other terms of the interaction?

This is exactly what I mean when I talk about alternative hardware: the introduction of a *resistant matter*, which marks the difference between the different

10 Cf. *supra*, pp. 116-117, footnote.

components of a system, but, at the same time, allows interaction, thus increasing at once the awareness of both distance and mediation.

To give a concrete example, we can consider the *mud tub*, a peculiar example of TUI (Tangible User Interface)[11] conceived by the artist Tom Gerhardt, which consists of a tub full of a muddy material. It is based on the

> use of a richly textured organic substance that takes advantage of human ingenuity and complex sensory ability; pioneering a new open-ended interaction typology where prescriptive goals are centered around states, rather than specific user manipulation. I.e., instead of having an user click a mouse button with their pointer finger, or gesture with two fingers in a specific way, he or she is simply asked to create a state in the Mud Tub surface, which can be accomplished in any manner of ways, including digging, molding, pressing, piling, etc. This creates a "buffer" between physical user action and digital result that allows for user improvisation and makes the system inherently adaptable[12].

Obviously it is difficult to imagine such a kind of interaction outside of artistic or experimental contexts. However, what is interesting here is the basic idea: the fact that the manipulation of an *adaptable matter* and the presence of a component of *delay* and *unpredictability* can foster the user's awareness of interaction and autonomous experimentation.

The challenge for a multimodal interface design that wants to maintain both the sense of distance and the sense of mediation could be to reconcile this avant-garde artistic intuition with more massive modes of distribution and use.

3.3. Resistance.

It remains to be seen whether and how successful such experiments can be in creating interfaces that do not sacrifice usability – and thus democratic access to the media – in the name of awareness. Surely there is still a long way to go, but such strategies can be considered real *practices of resistance*. It is a resistance to ideologies that spoil the design of interfaces and is not a resistance *to* the interfaces, but a resistance *in* the interfaces, in the interposing, between human and medium, a material, perceptible resistance.

To these practices of resistance philosophical mediology must, on the one hand, look with interest, in order to be able to draw always new elements useful to its theoretical investigation, and, on the other hand, give concrete support and provide a critical framework.

However, the common element to different resistance practices must be one: *multiplying traumas*[13]. As the user becomes accustomed to the *fatigue of interaction*,

11 For a reconnaissance and theoretical discussion on different TUI cases and, in general, experimental interfaces, see L. Perraudin, *Where have all the cases gone? Die offenen Behausungen des experimentellen Interfacedesigns*, in C. Bartz, T. Kaerlein, M. Miggelbrink, C. Neubert (eds.), *Gehäuse. Mediale Einkapselungen*, Fink, Paderborn 2019, pp. 271-291.

12 T. Gerhardt, *Mud Tub*, retrieved from http://tomgerhardt.com/mudtub/ (accessed 20 March 2020).

13 A book that talks about the creative potential of glitches, inefficiencies, and errors, configuring a line of resistance to ergonomics and to all the technical and cultural assumptions behind the current interface design is P. Krapp, *Noise Channels. Glitch and Error in Digital Culture*, University of Minnesota Press, Minneapolis-London 2011.

traumas will be normalized, but not smoothed, and thus they will help to keep media and mediation awareness alive.

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Philosophy understood as philosophical mediology cannot dictate to design the way forward. Rather, it will continue to move in the interstices and interfaces. But surely it will have to *interact* with design, mediate between its needs and its history on the one hand, and the need to achieve an optimal medial condition on the other.

The philosophers-mediologists will therefore have to interface with designers, or maybe – why not? – they will have to "get their hands dirty" by *opening the black box*, programming, intervening on the design of new interfaces. They will do this inspired by the techno-aesthetic and mediopolitical awareness, they will do it with the critical spirit and with the interstitial expertise that belong to them.

If Günther Anders said that we should «philosophize keeping the door open»[14], perhaps we should add that it is time to go through that door. Philosophers who want to affect the interfaces of our time will not have to limit themselves to looking at the screen: *they will have to go through it*.

14 G. Anders, *Philosophische Stenogramme*, Beck, München 1965, p. 5, my translation.

Works cited

Books.

- Adorno, T.W., *Negative Dialektik*, Suhrkamp, Frankfurt am Main 1966.
- Agamben, G., *Il Regno e la Gloria*, Neri Pozza, Vicenza 2007.
  Id., *L'uso dei corpi. Homo sacer, IV, 2*, Neri Pozza, Vicenza 2014.
- Alessio, F., *Mito e scienza in Ruggero Bacone*, Ceschina, Milano 1957.
- Ampere, A.-M., *Essai sur la Philosophie des Sciences. Seconde Partie*, Bachelier, Paris 1843.
- Anders, G., *Die Antiquiertheit des Menschen I. Über die Seele im Zeitalter der zweiten industriellen Revolution*, Beck, München 1961.
  Id., *Philosophische Stenogramme*, Beck, München 1965.
  Id., *Die Antiquiertheit des Menschen II. Über die Zerstörung des Lebens im Zeitalter der dritten industriellen Revolution*, Beck, München 1992.
- Andrejevic, M., *Automated Media*, Routledge, New York-London 2020.
- Aristotle, *Prior Analytics*, tr. R. Smith, Hackett, Indianapolis-Cambridge 1989.
  Id., *Posterior Analytics*, tr. J. Barnes, Clarendon Press, Oxford 1994.
  Id., *De Anima*, tr. M. Shiffman, Focus Publishing, Newburyport 2011.
- Assmann, A., *Erinnerungsräume. Formen und Wandlungen des kulturellen Gedächtnisses*, Beck, München 1999.
- Baricco, A., *The Game*, Einaudi, Torino 2018.
- Barthes, R., *Elements of Semiology*, tr. A. Lavers, C. Smith, Hill&Wang, New York 1997.
- Bartz, C., Kaerlein, T., Miggelbrink, M., Neubert, C. (eds.), *Gehäuse. Mediale Einkapselungen*, Fink, Paderborn 2019.
- Bataille, G., *La souveraineté*, Lignes, Paris 2012.
- Baudrillard, J., *Simulacra and Simulation*, tr. S.F. Glaser, The University of Michigan Press, Ann Arbor 1994.
- Baumgarten, A.G., *Aesthetica*, Kleyb, Frankfurt an der Oder 1758.
- Baxandall, M., *Painting and Experience in Fifteenth-Century Italy. A Primer in the Social History of Pictorial Style*, Oxford University Press, Oxford 1973.
- Bergson, H., *Matter and Memory*, tr. N.M. Paul, S. Palmer, Zone Books, New York 1991.
- Boehm, G. (ed.), *Was ist ein Bild?*, Fink, München 1994.
- Böhnke, A., Schröter, J. (eds.), *Analog/Digital – Opposition oder Kontinuum? Zur Theorie und Geschichte einer Unterscheidung*, Transcript, Bielefeld 2004.
- Butz, M.V., Sigaud, O., Swarup S. (eds.), *Anticipatory Behavior in Adaptive Learning Systems (ABiALS). Workshop Proceedings*, 2004.
- Cage, J., *I-VI*, Wesleyan University Press, Hanover-London 1990.
- Cambiano, G., *Platone e le tecniche*, Laterza, Roma-Bari 1991.
- Campanelli, V., *Web Aesthetics. How Digital Media Affect Culture and Society*, NAI,

Rotterdam 2010.
– Carbone, M., *Filosofia-schermi. Dal cinema alla rivoluzione digitale*, Cortina, Milano 2016.
– Casetti, F., *La galassia Lumiére. Sette parole chiave per il cinema che viene*, Bompiani, Milano 2015.
– Chang, B., Sprengerer, F., (eds.), *Thinking Media and Beyond. Perspectives from German Media Theory*, Routledge, London-New York 2019.
– Cicurel, R., Nicolelis, M.A.L., *The Relativistic Brain. How it works and why it cannot be simulated by a Turing Machine*, Kios, Natal-Montreux-Durham-São Paulo 2015.
– Citton, Y., *Pour une écologie de l'attention*, Seuil, Paris 2014.
Id., *Médiarchie*, Seuil, Paris 2017.
– Coccia, E., *The Life of Plants. A Metaphysics of Mixture*, tr. D.J. Montanari, Polity, Cambridge 2018.
– Coeckelbergh, M., *Introduction to Philosophy of Technology*, Oxford University Press, Oxford 2019.
– Costa, M., *Il sublime tecnologico. Piccolo trattato di estetica della tecnologia*, Castelvecchi, Roma 1998.
– De Angelis, V., *La logica della complessità*, Bruno Mondadori, Milano 1996.
– Debray, R., *Le Pouvoir intellectuel en France*, Ramsay, Paris 1979.
Id., *Introduction à la médiologie*, PUF, Paris 2000.
– Derrida, J., *Writing and Difference*, tr. A. Bass, Routledge, New York-London 2001.
– Descartes, R., *Les passions de l'âme*, Vrin, Paris 1964.
– Di Bari, V. (ed.), *Le parole della Net Economy A-L*, Il Sole 24 Ore Libri, Milano 2002.
– Diebner, H., Druckrey, T., Weibel, P. (eds.), *Sciences of the Interface, Proceedings of the International Symposium at the Center for Art and Media - Karlsruhe*, Genista, Tübingen, 2001.
– Dusek, V., *Philosophy of Technology. An Introduction*, Blackwell, Oxford 2006.
– Engell, L., Siegert, B., Vogl J. (eds.), *Licht und Leitung - Archiv für Mediengeschichte*, No. 2, Bauhaus-Universität Weimar, Weimar 2002.
– Ernst, W., *Medienwissen(schaft) zeitkritisch. Ein Programm aus der Sophienstraße*, Humboldt Universität, Berlin 2004.
Id., *The Deleyed Present: Media-Induced Tempor(e)alities & Techno-traumatic Irritations of "the Contemporary"*, Sternberg Press, Berlin 2017.
– Esposito, R., *Terza persona. Politica della vita e filosofia dell'impersonale*, Einaudi, Torino 2007.
– Ferraris, M., *Estetica razionale*, Cortina, Milano 1997.
Id., *Documentalità. Perché è necessario lasciar tracce*, Laterza, Roma-Bari 2009.
– Floridi, L., *Information. A Very Short Introduction*, Oxford University Press, Oxford 2010.
Id., *The Philosophy of Information*, Oxford University Press, Oxford 2011.
Id., *The Ethics of Information*, Oxford University Press, Oxford 2013.
Id., *The Fourth Revolution. How the Infosphere is Reshaping Human Reality*,

Oxford University Press, Oxford 2014.
Id. (ed.), *The Onlife Manifesto. Being Human in a Hyperconnected Era*, Springer, Cham-Heidelberg-New York-Dordrecht-London 2015.
Id., *The Logic of Information*, Oxford University Press, Oxford 2019.
– Flusser, V., *Towards a Philosophy of Photography*, tr. A. Mathews, Reaktion, London 2000.
Id., *Into the Universe of Technical Images*, tr. N.A. Roth, University of Minnesota Press, Minneapolis-London 2011.
– Foster, H. (ed.), *Vision and Visuality, Discussions in Contemporary Culture*, Bay Press, Seattle 1988.
– Foucault, M., *The Birth of Biopolitics. Lectures at the Collège de France 1978-79*, tr. G. Burchell, Palgrave Macmillan, London-New York 2008.
– Freedberg, D., *The Power of Images. Studies in the History and Theory of Response*, University of Chicago Press, Chicago 1989.
– Gadamer, H.-G., *Truth and Method*, tr. J. Weinsheimer and D.G. Marshall, Continuum, New York 1997.
– Galibert, J.-P., *Les Chronophages. 7 principes de l'hypercapitalisme*, Lignes, Paris 2014.
– Galloway, A.R., *The Interface Effect*, Polity, Cambridge 2012.
– Galloway, A.R., Thacker, E., Wark, M., *Excommunication. Three Inquiries in Media and Mediation*, The University of Chicago Press, Chicago-London 2014.
– Gitelman, L., *Always Already New. Media, History, and the Data of Culture*, The MIT Press, Cambridge-London 2006.
– Greenberger, M. (ed.), *Computers, Communications, and the Public Interest*, The Johns Hopkins University Press, Baltimore 1971.
– Han, B.-C., *In the Swarm. Digital Prospects*, tr. E. Butler, The MIT Press, Cambridge-London 2017.
Id., *Psychopolitics. Neoliberalism and New Technologies of Power*, tr. E. Butler, Verso, London-New York 2017.
– Hansen, M.B.N., *Bodies in Code. Interfaces with Digital Media*, Routledge, New York-London 2006.
– Haraway, D., *A Cyborg Manifesto. Science, Technology, and Socialist-Feminism in the Late Twentieth Century*, Routledge, London-New York 1991.
– Hardt, M., Negri, A., *Empire*, Harvard University Press, Cambridge-London 2000.
– Hassan, R., Sutherland, T., *Philosophy of Media. A Short History of Ideas and Innovations from Socrates to Social Media*, Routledge, London-New York 2017.
– Hegel, G.W.F., *Aesthetics. Lectures on Fine Art*, tr. T.M. Knox, 2 vols., Clarendon Press, Oxford 1975.
Id., *The Phenomenology of Spirit*, tr. M. Inwood, Oxford University Press, Oxford 2018.
– Heidegger, M., *Being and Time. A Translation of Sein und Zeit*, tr. J. Stambaugh, State University of New York Press, Albany 1996.
Id., *The Question Concerning Technology and Other Essays*, tr. W. Lovitt, Garland, New York-London 1977.
– Hickethier, K., *Einführung in die Medienwissenschaft*, Metzler, Stuttgart 2010.

– Hookway, B., *Interface*, MIT Press, Cambridge-London 2014.
– Horkheimer, M., Adorno, T.W., *Dialectic of Enlightenment. Philosophical Fragments*, tr. E. Jephcott, Stanford University Press, Stanford 2002.
– Hui, Y., *On the Existence of Digital Objects*, University of Minnesota Press, Minneapolis-London 2016.
– Innis, H.A., *Empire and Communication*, Dundurn Press, Toronto 2007.
Id., *A History of the Canadian Pacific Railway*, HardPress, Lenox 2012.
– Kant, I., *Logic*, tr. J. Richardson, W. Simpkin and E. Marshall, London 1819.
Id., *Critique of Pure Reason*, tr. P. Guyer, A.W. Wood, Cambridge University Press, Cambridge 1998.
Id., *Anthropology from a Pragmatic Point of View*, tr. R.B. Louden, Cambridge University Press, Cambridge 2006.
Id., *Critique of Judgement*, tr. J.C. Meredith, Oxford University Press, Oxford 2007.
– Kirwan, J., *Sublimity. The Non-Rational and the Irrational in the History of Aesthetics*, Routledge, New York-London 2005.
– Kittler, F.A., *Discourse Networks 1800/1900*, tr. M. Metteer and C. Cullens, Stanford University Press, Stanford 1990.
Id. (ed.), *Austreibung des Geistes aus den Geisteswissenschaften. Programme des Poststrukturalismus*, Schöningh, Padeborn-München-Wien-Zürich 1992.
Id., *Gramophone, Film, Typewriter*, tr. G. Winthrop-Young, M. Wutz, Stanford University Press, Stanford 1999.
Id., *Optical Media. Berlin Lectures 1999*, tr. A. Enns, Polity, Cambridge 2010.
Id., *The Truth of the Technological World. Essays on the Genealogy of Presence*, tr. E. Butler, Stanford University Press, Stanford 2013.
– Krapp, P., *Noise Channels. Glitch and Error in Digital Culture*, University of Minnesota Press, Minneapolis-London 2011.
– Kurzweil, R., *The Singularity is Near. When Human Transcends Biology*, Viking, New York 2005.
– Latour, B., Weibel, P. (eds.), *Iconoclash: Beyond the Image Wars in Science, Religion, and Art*, The MIT Press, Cambridge-London 2002.
– Leibniz, G.,W., *Monadologie und andere metaphysische Schriften*, tr. U.J. Schneider, Felix Meiner, Hamburg 2002.
– Lemke, T., *Biopolitics. An Advanced Introduction*, tr. E.F. Trump, New York University Press, New York-London 2011.
– Leroi-Gourhan, A., *Le geste et la parole I. Technique et langage*, Albin Michel, Paris 1964.
Id., *Le geste et la parole II. La mémoire et les rythmes*, Albin Michel, Paris 1965.
Id., *L'homme et la matière*, Albin Michel, Paris 1993.
Id., *Milieu et techniques*, Albin Michel, Paris 2000.
– Levine, D.J. (ed.), *Opera through Other Eyes*, Stanford University Press, Stanford 1994.
– Lingua, G., *L'icona, l'idolo e la guerra delle immagini*, Medusa, Milano 2006.
– Long, P., Wall, T., *Media Studies. Texts, Production and Context*, Longman, Harlow 2009.
– Lucretius Carus, T., *On the Nature of Things*, tr. M. Ferguson Smith, Hackett,

Indianapolis 2001.
– Lyotard, J.-F., *Postmodern Fables*, tr. G. Van Den Abbeele, University of Minnesota Press, Minneapolis-London 1997.
– Maier, A., Škec, S., Kim, H., Kokkolaras, M., Oehmen, J., Fadel, G., Salustri, F., Van der Loos, M. (eds.), *Proceedings of the 21 International Conference on Engineering Design (ICED17), Vol. 8: Human Behaviour in Design*, Vancouver, 21-25 August 2018.
– Mancuso, S., *La nazione delle piante*, Laterza, Roma-Bari 2019.
– Manovich, L., *The Language of New Media*, The MIT Press, Cambridge-London 2002.
Id., *Software Takes Command*, Bloomsbury, New York-London 2013.
– Marcuse, H., *One-Dimensional Man. Studies in the Ideology of Advanced Industrial Society*, Routledge, London-New York 2006.
– Markham, T., Rodgers, S., (eds.), *Conditions of Mediation. Phenomenological Perspectives on Media*, Peter Lang, Bern 2017.
– Marra, C., *L'immagine infedele. La falsa rivoluzione della fotografia digitale*, Bruno Mondadori, Milano 2006.
– Matzker, R., Zielinski, S. (eds.), *Medienwissenschaft, Teil 5, Fiktion als Fakt, "Metaphysik" der neuen Medien, Jahrbuch für Internationale Germanistik, Reihe C, Band4/5*, Peter Lang, Bern 2000.
– Mazzocco, D., *Cronofagia. Come il capitalismo depreda il nostro tempo*, D Editore, Roma 2019.
– McLuhan, M., *Understanding Media. The extensions of Man*, Routledge, London-New York 2005.
– McLuhan, M., McLuhan, E., *Laws of Media. The New Science*, University of Toronto Press, Toronto 1988.
Idd., *Media and Formal Cause*, NeoPoiesisPress, Houston 2011.
– Mead, G.H., *Mind, Self, and Society from the Standpoint of a Social Behaviorist*, University of Chicago Press, Chicago-London 1972.
– Melandri, E., *La linea e il circolo. Studio logico-filosofico sull'analogia*, il Mulino, Bologna 1968.
– Merleau-Ponty, M., *The Primacy of Perception and Other Essays on Phenomenological Psychology, the Philosophy of Art, History and Politics*, ed. J.M. Edie, Northwestern University Press, Evanston 1964.
Id., *Phenomenology of Perception*, tr. D.A. Landes, Routledge, London-New York 2012.
– Miller, A.R., *The Cryptographic Mathematics of the Enigma*, Center for Crypological History, National Security Agency, 2001.
– Mitchell, W.J.T., Hansen, M.B.N. (eds.), *Critical Terms for Media Studies*, University of Chicago Press, Chicago 2010.
– Montani, P., *Tecnologie della sensibilità. Estetica e immaginazione interattiva*, Cortina, Milano 2014.
– Moores, S., *Media/Theory. Thinking About Media and Communications*, Routledge, London-New York 2005.
– Nancy, J.-L., *Being Singular Plural*, tr. R. Richardson, A. O'Byrne, Stanford University Press, Stanford 2000.

– Näser-Lather, M., Neubert, C. (eds.), *Traffic. Media as Infrastructures and Cultural Practices*, Brill, Leiden-Boston 2015.
– von Neumann, J., *Theory of Self-Reproducing Automata*, ed. A.W. Burks, University of Illinois Press, Urbana 1966.
– Nietzsche, F.W., *Twilight of the Idols. Or, How to Philosophize with the Hammer*, tr. R. Polt, Hackett, Indianapolis-Cambridge 1997.
– Ong, W.J., *Orality and Literacy*, Routledge, New York-London 2012.
– Parikka, J., *What Is Media Archaeology?*, Polity, Cambridge 2012.
Id., *A Geology of Media*, University of Minnesota Press, Minneapolis-London 2015.
– Pezzulo, G., Butz, M.V., Castelfranchi, C., Falcone, R. (eds.), *The Challenge of Anticipation. A Unifying Framework for the Analysis and Design of Artificial Cognitive Systems*, Springer, Berlin-Heidelberg 2008.
– Pias, C., *Computer Game Worlds*, tr. V.A. Pakis, Diaphanes, Zurich-Berlin 2017.
– Pinotti, A., Somaini, A. (eds.), *Teoria dell'immagine. Il dibattito contemporaneo*, Cortina, Milano 2009.
Idd., *Cultura visuale. Immagini, sguargi, media, dispositivi*, Einaudi, Torino 2016.
– Plato, *Complete Works*, eds. J.M. Cooper, D.S. Hutchinson, Hackett, Indianapolis-Cambridge 1997.
– Plessner, H., *Levels of Organic Life and the Human. An Introduction to Philosophical Anthropology*, tr. M. Hyatt, Fordham University Press, New York 2019.
– Pliny the Elder, *Natural History, Volume IX: Books 33-35*, tr. H. Rackham, Harvard University Press, Cambridge 1952.
– Rancière, J., *The Politics of Aesthetics. The Distribution of the Sensible*, tr. G. Rockhill, Bloomsbury, London-New York 2013.
– Reilly, E.D. (ed.), *Concise Encyclopedia of Computer Science*, Wiley, Hoboken 2004.
– Reuleaux, F., *The kinematics of machinery. Outlines of a theory of machines*, tr. A.B.W. Kennedy, Dover, New York 2012.
– Rid, T., *Rise of the Machines. The Lost History of Cybernetics*, Scribe, Melbourne-London 2016.
– Ronchi, R., *Il canone minore. Verso una filosofia della natura*, Feltrinelli, Milano 2017.
– Rossi, P., *I filosofi e le macchine 1400-1700*, Feltrinelli, Milano 2009.
– Sacks, O., *The Man Who Mistook His Wife for a Hat*, ISIS, Oxford 2010.
– Scheler, M., *The Human Place in the Cosmos*, tr. M.S. Frings, Northwestern University Press, Evanston 2009.
– Schrödinger, E., *What is Life? with Mind and Matter and Autobiographical Sketches*, Cambridge University Press, Cambridge 1992.
– Schwarz, H., *Art and Photography. Forerunners and Influences*, ed. W.E. Parker, University of Chicago Press, Chicago-London 1987.
– Searle, J.R., *The Construction of Social Reality*, Free Press, New York 1995.
– Seifert, U., Kim, J.H., Moore, A. (eds.), *Paradoxes of Interactivity. Perspectives for Media Theory, Human-Computer Interaction, and Artistic Investigations*, Transcript, Bielefeld 2008.
– Severino, E., *Téchne*, Rusconi, Milano 1979.

Id., *Il destino della tecnica*, R.C.S., Milano 1998.
– Shannon, C.E., Weaver, W., *The Mathematical Theory of Communication*, The University of Illinois Press, Urbana 1964.
– Siegert, B., *Cultural Techniques. Grids, Filters, Doors, and Other Articulations of the Real*, tr. G. Winthrop-Young, Fordham University Press, New York 2015.
– Simondon, G., *Du mode d'existence des objets techniques*, Aubier, Paris 2012.
Id., *Sur la technique*, PUF, Paris 2014.
Id., *L'individuation à la lumière des notions de forme et d'information*, Millon, Grenoble 2017.
– Stiegler, B., *De la misère symbolique. Vol. I L'époque hyperindustrielle*, Galilée, Paris 2004.
– Stiegler, B., Ars Industrialis, *Réenchanter le monde. La valeur esprit contre le populisme industriel*, Flammarion, Paris 2006.
– Strickland, L., *Leibniz's Monadology. A New Translation and Guide*, Edinburgh University Press, Edinburgh 2014.
– Tatarkiewicz, W., *A History of Six Ideas. An Essay in Aesthetics*, tr. C. Kasparek, Martinus Nijhoff, The Hague-Boston-London 1980.
– Teuscher, C. (ed.), *Alan Turing. Life and Legacy of a Great Thinker*, Springer, Berlin-Heidelberg 2004.
– Trentowski, B.F., *Stosunek filozofii do cybernetyki czyli sztuki rządzenia narodem. Rzecz treści politycznej*, Żupański, Poznań 1843.
– Turkle, S., *Reclaiming Conversation. The Power of Talk in a Digital Age*, Penguin, New York 2015.
– Vercellone, F., *Il futuro dell'immagine*, il Mulino, Bologna 2017.
– Verdicchio, M., Clifford, A., Rangel, A., Carvalhais, M. (eds.), *xCoAx 2016: Fourth Conference on Computation, Communication, Aesthetics and X* (conference proceedings), Bergamo, 7-8 Luglio 2016.
– Vignola, P., *L'attenzione altrove. Sintomatologie di quel che ci accade*, Orthotes, Napoli-Salerno 2013.
– Watson, R., Blondheim, M. (eds.), *The Toronto School of Communication Theory. Interpretations, Extensions, Applications*, The Hebrew University Magnes Press, Jerusalem 2007.
– Wiener, N., *Cybernetics. Or Control and Communication in the Animal and the Machine*, The MIT Press, Cambridge-London 1985.
– Winthrop-Young, G., *Kittler and the Media*, Polity, Cambridge 2011.
– von Zglinicki, F.P., *Der Weg des Films*, Rembrandt, Berlin 1979.
– Zielinski, S., *Deep Time of Media. Toward an Archaeology of Hearing and Seeing by Technical Means*, tr. G. Custance, The MIT Press, Cambridge-London 2006.
– Žižek, S., *The Plague of Fantasies*, Verso, London-New York 2008.

Essays in books.

– Andersen, E., Maier, A., *The Attentional Capture of Colour in Visual Interface Design: A Controlled-Environment Study*, in Maier, A., Škec, S., Kim, H., Kokkolaras, M., Oehmen, J., Fadel, G., Salustri, F., Van der Loos, M. (eds.), *Proceedings of the 21*

International Conference on Engineering Design (ICED17), Vol. 8: Human Behaviour in Design, Vancouver, 21-25 August 2018, pp. 519-528.
- Boehm, G., *Die Wiederkehr der Bilder*, in Id. (ed.), *Was ist ein Bild?*, Fink, München 1994, pp. 11-38.
- Bonizovski, S., Bonizovska, L., *Anticipatory Brain Potentials: An Electrophysiological Insight into the Anticipatory Behavior of Adaptive Learning Systems*, in Butz, M.V., Sigaud, O., Swarup S. (eds.), *Anticipatory Behavior in Adaptive Learning Systems (ABiALS). Workshop Proceedings*, 2004, pp. 1-10.
- Burks, A.W., *Editor's Introduction*, in von Neumann, J., *Theory of Self-Reproducing Automata*, ed. A.W. Burks, University of Illinois Press, Urbana 1966, pp. 1-28.
- Ferraris, M., *Documentality or Why Nothing Social Exists Beyond the Text*, in Kanzian, C., Runggaldier, E. (eds.), *Cultures. Conflict – Analysis – Dialogue. Proceedings of the 29th International Ludwig Wittgenstein-Symposium in Kirchberg, Austria*, Publications of the Austrian Ludwig Wittgenstein Society, New Series, 3 (2007), pp. 385-401.
- Galloway, A.R., *Love of the Middle*, in Galloway, A.R., Thacker, E., Wark, M., *Excommunication. Three Inquiries in Media and Mediation*, The University of Chicago Press, Chicago-London 2014, pp. 25-76.
- Hagen, W., *Es gibt kein digitales Bild. Eine medienepistemologische Anmerkung*, in Engell, L., Siegert, B., Vogl J. (eds.), *Licht und Leitung - Archiv für Mediengeschichte*, No. 2, Bauhaus-Universität Weimar, Weimar 2002, pp. 103-110.
- Heidegger, M., *The Question Concerning Technology*, in Id., *The Question Concerning Technology and Other Essays*, tr. W. Lovitt, Garland, New York-London 1977, pp. 3-35.

  Id., *The Age of the World Picture*, in Id., *The Question Concerning Technology and Other Essays*, tr. W. Lovitt, Garland, New York-London 1977, pp. 132-133.
- Jay, M., *Scopic regimes of modernity*, in Foster, H. (ed.), *Vision and Visuality, Discussions in Contemporary Culture*, Bay Press, Seattle 1988, pp. 3-23.
- Jonas, H., *Homo Pictor: Von der Freiheit des Bildens*, in Boehm, G. (ed.), *Was ist ein Bild?*, Fink, München 1994, pp. 105-124.
- Kittler, F., *Weltatem. On Wagner's Media Technology*, in Levine, D.J. (ed.), *Opera through Other Eyes*, Stanford University Press, Stanford 1994, pp 215-235.

  Id., *The World of the Symbolic – A World of the Machine*, tr. S. Harris, in Id., *Literature, Media, Information Systems*, ed. J. Johnston, OPA, Amsterdam 1997, pp 130-146.

  Id., *There Is No Software*, in Id., *The Truth of the Technological World. Essays on the Genealogy of Presence*, tr. E. Butler, Stanford University Press, Stanford 2013, pp. 219-229.
- Kurzweil, R., *The Law of Accelerating Returns*, in Teuscher, C. (ed.), *Alan Turing. Life and Legacy of a Great Thinker*, Springer, Berlin-Heidelberg 2004, pp. 381-416.
- Latour, B., *What is Iconoclash? Or is There a World Beyond the Image Wars?*, in Latour, B., Weibel, P. (eds.), *Iconoclash: Beyond the Image Wars in Science, Religion, and Art*, The MIT Press, Cambridge-London 2002, pp. 15-40.
- Leibniz, G.,W., *Principes de la nature fondés en raison et de la grâce*, in Id.,

Monadologie und andere metaphysische Schriften, tr. U.J. Schneider, Felix Meiner, Hamburg 2002.
- Lyotard, J.-F., *Anima Minima*, in Id., *Postmodern Fables*, tr. G. Van Den Abbeele, University of Minnesota Press, Minneapolis-London 1997, pp. 235-249.
- Mangold, J., *Traffic of Metaphor: Transport and Media at the Beginning of Media Theory*, in Näser-Lather, M., Neubert, C. (eds.), *Traffic. Media as Infrastructures and Cultural Practices*, Brill, Leiden-Boston 2015, pp. 73-91.
- Merleau-Ponty, M., *Eye and Mind*, tr. C. Dallery, in Id., *The Primacy of Perception and Other Essays on Phenomenological Psychology, the Philosophy of Art, History and Politics*, Northwestern University Press, Evanston 1964, pp. 159-190.
- Nake, F., *Surface, Interface, Subface. Three Cases of Interaction and One Concept*, in Seifert, U., Kim, J.H., Moore, A. (eds.), *Paradoxes of Interactivity. Perspectives for Media Theory, Human-Computer Interaction, and Artistic Investigations*, Transcript, Bielefeld 2008, pp. 92–109.

  Id., *The Disappearing Masterpiece. Digital Image & Algorithmic Revolution*, in Verdicchio, M., Clifford, A., Rangel, A., Carvalhais, M. (eds.), *xCoAx 2016: Fourth Conference on Computation, Communication, Aesthetics and X* (conference proceedings), Bergamo, 7-8 Luglio 2016, pp. 12-27.
- Nancy, J.-L., *On Being Singular Plural*, in Id., *Being Singular Plural*, tr. R. Richardson, A. O'Byrne, Stanford University Press, Stanford 2000, pp. 1-101.
- Perraudin, L., *Where have all the cases gone? Die offenen Behausungen des experimentellen Interfacedesigns*, in Bartz, C., Kaerlein, T., Miggelbrink, M., Neubert, C. (eds.), *Gehäuse. Mediale Einkapselungen*, Fink, Paderborn 2019, pp. 271-291.
- Pezzulo, G., Butz, M.V., Castelfranchi, C., *The Anticipatory Approach: Definitions and Taxonomies*, in Pezzulo, G., Butz, M.V., Castelfranchi, C., Falcone, R. (eds.), *The Challenge of Anticipation. A Unifying Framework for the Analysis and Design of Artificial Cognitive Systems*, Springer, Berlin-Heidelberg 2008, pp. 23-43.
- Plato, *Symposium*, tr. A. Nehamas, P. Woodruff, in Id., *Complete Works*, eds. J.M. Cooper, D.S. Hutchinson, Hackett, Indianapolis-Cambridge 1997, pp. 457-505.

  Id., *Phaedrus*, tr. A. Nehamas, P. Woodruff, in Id., *Complete Works*, eds. J.M. Cooper, D.S. Hutchinson, Hackett, Indianapolis-Cambridge 1997, pp. 506-556.

  Id., *Alcibiades*, tr. D.S. Hutchinson, in Id., *Complete Works*, eds. J.M. Cooper, D.S. Hutchinson, Hackett, Indianapolis-Cambridge 1997, pp. 557-595.
- Schrödinger, E., *What is Life? The Physical Aspect of the Living Cell*, in Id. *What is Life? with Mind and Matter and Autobiographical Sketches*, Cambridge University Press, Cambridge 1992, pp. 1-90.
- Simon, H., *Designing organizations for an information-rich world*, in Greenberger, M. (ed.), *Computers, Communications, and the Public Interest*, The Johns Hopkins University Press, Baltimore 1971, pp. 37-72.
- Simondon, G., *Réflexion sur la techno-esthétique*, in Id., *Sur la technique*, PUF, Paris 2014, pp. 379-396.
- Trogemann, G., *Irritation versus Intuition. Notizen zur Situation der Informatik*, in Matzker, R., Zielinski, S. (eds.), *Medienwissenschaft, Teil 5, Fiktion als Fakt, "Metaphysik" der neuen Medien, Jahrbuch für Internationale Germanistik, Reihe C, Band4/5*, Peter Lang, Bern 2000, pp. 45-59.

– Trogemann, G., Göllner, S., Scherffig, L., *Unort-Kataster. An Urban Experiment Towards Participatory Media Development*, in Seifert, U., Kim, J.H., Moore, A. (eds.), *Paradoxes of Interactivity. Perspectives for Media Theory, Human-Computer Interaction, and Artistic Investigations*, Transcript, Bielefeld 2008, pp. 192-217.
– Trogemann, G., Viehoff, J., Roch, A., *Interfaces and Errors*, in Diebner, H., Druckrey, T., Weibel, P. (eds.), *Sciences of the Interface, Proceedings of the International Symposium at the Center for Art and Media - Karlsruhe*, Genista, Tübingen, 2001, pp. 96 -110.
– Verbeek, P.-P., *Designing the Public Sphere: Information Technologies and the Politics of Mediation*, in Floridi, L. (ed.), *The Onlife Manifesto. Being Human in a Hyperconnected Era*, Springer, Cham-Heidelberg-New York-Dordrecht-London 2015, pp. 217-227.

Articles in journals.

– Alloa, E., *Metaxu. Figures de la médialité chez Aristote*, in «Revue de Métaphysique et de Morale», No. 2, *Méthode et interprétation à l'âge Classique* (Avril-Juin 2009), pp. 247-262.
– Anders (Stern), G., *Une interprétation de l'a posteriori*, in «Recherches Philosophiques», 4, 1934-35, pp. 65-80.
Id., *The Pathology of Freedom. An Essay on Non-Identification*, tr. K. Wolfe, in «Deleuze and Guattari Studies», Vol. 3, Issue 2, December 2009, pp. 278-310.
– Andersen, C.U., Cox, G., Papadopoulos, G., *Editorial*, in «APRJA Post-Digital Research», Issue 3.1 (2014).
– Appadurai, A., *Disjuncture and Difference in the Global Cultural Economy*, in «Public Culture» (1990), 2 (2), pp. 1-24.
– Arbor, J.L., *Animal Chauvinism, Plant-Regarding Ethics and the Torture of Trees*, in «Australian Journal of Philosophy», 64.3 (1986), pp. 335–369.
– Audouze, F., *Leroi-Gourhan, a Philosopher of Technique and Evolution*, in «Journal of Archaeological Research», Vol. 10, No. 4 (December 2002), pp. 277-306.
– Bazin, A., *The Ontology of the Photographic Image*, tr. H. Gray, in «Film Quarterly», Vol. 13, No. 4. (Summer 1960), pp. 4-9.
– Belting, H., *Image, Medium, Body: A New Approach to Iconology*, in «Critical Inquiry», Vol. 31, No. 2 (Winter 2005), pp. 302-319.
– Bonacci, V., *Inoperosità in Giorgio Agamben*, in «Pólemos», V. 2-3 (2010), pp. 174-189.
– Carbone, M., *Dei poteri dell'archi-schermo e dell'ideologia della "Trasparenza 2.0"*, in «Between», VIII.16, 2018.
– Chun, W.H.K., *On Software, or the Persistence of Visual Knowledge*, in «Grey Room», 18 (Winter 2004), pp. 26-51.
– Compton, R.J., *The Interface Between Emotion and Attention: A Review of Evidence from Psychology and Neurosciences*, in «Behavioral and Cognitive Neuroscience Reviews», 2 (2003), pp. 115-129.
– Danto, A., *Seeing and Showing*, in «Journal of Aesthetics and Art Criticism», 59

(2001), pp. 1-9.
– De Cesaris, A., Striano, F., *La filosofia è un discorso pubblico? Medialità e mediaticità del discorso filosofico*, in «Point of Interest», N. 2, I/2018, pp. 102-122.
– Didi-Huberman, G., *L'image brûle*, in «Art Press», special issue no. 25, 2004, pp. 68-73.
– Ernst, W., *Radical Media Archaeology (its epistemology, aesthetics and case studies)*, in «Artnodes», n. 21 (2018), pp. 35-43.
– Esposito, R., Campbell, T., *For a Philosophy of the Impersonal*, in «CR: The New Centennial Review», Vol. 10, No. 2, New Paths in Political Philosophy (fall 2010), pp. 121-134.
– Ferrando, F., *Posthumanism, Transhumanism, Antihumanism, Metahumanism, and New Materialisms. Differences and Relations*, in «Existenz», Volume 8, No 2, Fall 2013, pp. 26-32.
– Floridi, L., *What is the Philosophy of Information?*, in «Metaphilosophy», Vol. 33, No. 1/2 (January 2002), pp. 123-145.
– Freedberg, D., Gallese, V., *Motion, emotion and empathy in esthetic experience*, in «TRENDS in Cognitive Science», Vol. 11, N. 5 (2007), pp. 197-203.
– Gullory, J., *Genesis of the Media Concept*, in «Critical Inqury», 36 (Winter 2010), pp. 321-362.
– Leroy, L., *L'Exposition des impressionnistes*, in «Le Chiarivari», 25 aprile 1874.
– Mangen, A., Walgermo, B.R., Brønnick, K., *Reading linear texts on paper versus computer screen: Effects on reading comprehension*, in «International Journal of Educational Research», vol. 58 (2013), pp. 61-68.
– Maxwell, J.C., *On governors*, in «Proceedings of the Royal Society of London», 16 (1868), pp. 270-283.
– Metz, C., *Le signifiant imaginaire*, in «Communications», 23 (1975), pp. 3-55.
– Pessoa, L., McKenna, M., Guiterrez, E. Ungerleider, L.G., *Neural Processing of Emotional Faces Requires Attention*, in «Proceedings of the National Academy of Sciences», 99 (17) (2002), pp. 11458-11463.
– Powers, T.M., *Real wrongs in virtual communities*, in «Ethics and Information Technology», n. 5, 2003, pp. 191-198.
– Sauerberg, L.O., *The Gutenberg Parenthesis. Print, Book and Cognition*, in «Orbis Litterarum», Vol. 64, Issue 2 (April 2009), pp. 79-80.
– Shannon, C.E., *A Symbolic Analysis of Relay and Switching Circuits*, in «Transactions American Institute of Electrical Engineers», Vol. 57 (1938), pp. 38-80.
– Simondon, G., *Entretien sur la Mécanologie*, in «Revue de synthèse», t. 130, n° 1, 2009, p. 103-132.
– Stiegler, B., *The Theater of Individuation: Phase-Shift and Resolution in Simondon and Heidegger*, tr. K. Lebedeva, in «Parrhesia», n. 7 (2009), pp. 46-57.
– Striano, F., *Fenomenologia del cyber-stupro. Note ontologico-filosofiche sulla violenza informaticamente mediata*, in «Lessico di Etica Pubblica», 1 (2018), pp. 92-106.
Id., *Towards "Post-Digital". A Media Theory to Re-Think the Digital Revolution*, in «Ethics in Progress», Vol. 10 (2019), No. 1, pp. 83-93.
– Wiener, N., *Some Moral and Technical Consequences of Automation. As machines*

learn they may develop unforeseen strategies at rates that baffle their programmers, in «Science», vol. 131, 6 May 1960, pp. 1355-1358.

Websites.

- *Blue light has a dark side. What is blue light? The effect blue light has on your sleep and more*, «Harvard Health Letter», published: May, 2012, updated: August 13, 2018: https://www.health.harvard.edu/staying-healthy/blue-light-has-a-dark-side.
- *Conditioning (psychology)* (Encyclopaedia Britannica): https://www.britannica.com/science/conditioning.
- *Gebrauchsanleitung für die Chiffriermachine Enigma*: https://www.ilord.com/enigma-manuals.
- *ITU releases 2018 global and regional ICT estimates. For the first time, more than half of the world's population is using the Internet*: https://www.itu.int/en/mediacentre/Pages/2018-PR40.aspx.
- *Philosophy* (Cambridge Dictionary): https://dictionary.cambridge.org/it/dizionario/inglese/philosophy.
- Gerhardt, T., *Mud Tub*: from http://tomgerhardt.com/mudtub/.
- Jones, J., *Flat, soulless and stupid: why photographs don't work in art galleries*, «The Guardian», 13 November 2014: https://www.theguardian.com/artanddesign/jonathanjonesblog/2014/nov/13/why-photographs-dont-work-in-art-galleries.

  Id., *The $6.5m canyon: it's the most expensive photograph ever – but it's like a hackneyed poster in a posh hotel*, «The Guardian», 10 December 2014: https://www.theguardian.com/artanddesign/jonathanjonesblog/2014/dec/10/most-expensive-photograph-ever-hackneyed-tasteless.
- Kittler, F., *The History of Communication Media*: https://journals.uvic.ca/index.php/ctheory/article/view/14325/5101.
- Mangen, A., Olivier, G., Velay, J.-L., *Comparing Comprehension of a Long Text Read in Print Book and on Kindle: Where in the Text and When in the Story?*, in «Frontiers in Psychology», 15 February 2019: https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00038/full.
- Rebecchi, M., *Una Filosofia-schermi. Intervista a Mauro Carbone*, in «Il lavoro culturale», 7 September 2017: https://www.lavoroculturale.org/una-filosofia-schermi-per-lepoca-degli-schermi-mondo/.

Emails.

–Carbone, M., *Re: Charimenti*, message to Francesco Striano, 1 April 2020.

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