1

Simondon's Philosophy of Technics: A Work Program

To reproduce Simondon's gesture, we must clearly establish our position relative to his philosophy of technics. Our discussion, therefore, begins with a conceptual characterization of Simondon's philosophy that draws from a dialogue between the two works of our corpus.

Stated as generally as possible, our claim is as follows: Simondon's philosophy of technics is a philosophy of technicity and the methodological gestures that update this technicity.

1.1. A philosophy of technicity

The two texts of our corpus enable us to understand the specific nature of Simondon's philosophy of technics more precisely: a dynamic field that welcomes questioning and reappropriation.

Thus, *On the Mode of Existence of Technical objects* (MOET) and *psychosociology of technicality* both study the relationship between humankind and technical objects, but from two different perspectives – the objective perspective of the genesis of the object itself (MEOT) and the objectal perspective of the life of objects within a psychosocial setting (PST).

THE OBJECTIVE/OBJECTAL DISTINCTION.– The distinction between objective/objectal was established by J.-Y. Chateau in the introduction of the collection *Sur la technique* [SIM 14b]. Although MEOT discusses the essence of technical objects and their objectivity, PST considers how the same objects become independent once projected into the social world, according to an "objectal" mode that is distinct from – albeit dependent on – the first. Once the technical production of an object is complete and this object has fulfilled its objectivity, it becomes detachable from its producer and is invested with psychosocial meaning.

To be more precise, the necessity of reconciling culture and technics is the starting postulate of MEOT. The first few sentences of the introduction state the *raison d'être* of an entire book seeking to legitimize technical objects ontologically[1]: "This study is motivated by our desire to raise awareness of the meaning of technical objects". If raising awareness is necessary, there must effectively be some form of divorce: "culture has constituted itself as a defense system against technics" [SIM 12, Introduction, p. 1]. A dialogue is thus created between the reflections of MEOT and PST. The latter accepts the ontological framework as a starting point without attempting to develop it, aiming instead to further explore the psychological aspects of the relationships between humans and technical objects. The psychological and philosophical reflections of both papers call and answer one another.

One might object that this connection between MEOT and PST is arbitrary; perhaps it would have been just as effective to contrast the secondary thesis with another lecture from the same collection; in response, we would observe that PST is unique among the other lectures in that it presents a very complete and systematic framework of thought. Its architecture, while somewhat underdeveloped as a result

1 The philosophy of MEOT is a continuation of Simondon's primary thesis, which develops a genetic ontology of living beings in general. For further discussion, see [BAR 05b]. We will view technological research as an attempt to reconcile technics and culture, without immediately adopting the perspective of an ontology of nature.

of the limited format, is just as ambitious as MEOT. The theoretical scope of this lecture on psychosociology extends the scope of the ideas advanced by MEOT; furthermore, it questions and modulates some of the analysis of the latter. This questioning, three years after MEOT was published, is fundamental. As a further justification of the coherence of this corpus, observe that the two texts are not just complementary; their reconciliation is problematic. PST questions the conclusions of MEOT on two interrelated points: technicity and the status of its representatives.

ON THE IMPORTANCE OF PST.– In his introduction, J.-Y. Chateau writes that PST provides the missing perspective for Simondon's "three-part" ontology, which aims to "reposition the individual within the being according to the three levels of physical appearance, vitality, and psychosociality" [SIM 13, p. 32]. Although PST is in principle subordinate to the two theses (as a lecture, an oral format, therefore less precise, shorter), it effectively extends the first two perspectives in terms of principal concepts (objectality, open/closed objects) that open toward more general considerations, such as the concept of network. The importance of PST was also emphasized by the editors of the collection; PST was chosen as the inaugural lecture. J.-Y. Chateau makes a typographical distinction from the other lectures. In his introduction, he cites various texts of the collection; the majority (excluding fragments, notes and interviews) are also lectures, but only PST is italicized (and therefore recognized as a text in its own right); the other texts are cited in quotes. This editorial decision is suggestive; PST was granted a leading status among the new texts of the collection. Indeed, the content of the other texts in the collection is more localized than the topics developed by PST and does not directly dialogue with the two principal theses. *L'effet de halo en matière technique,* for example, only attempts to supplement PST on a single specific topic, the question of quasi-religious and asymmetric community (there is "something religious" in the halo) of users that forms around the technical object. This contribution extends the general theoretical framework established by PST.

Contrasting these two perspectives gives rise to a dual line of inquiry. These two open questions that we shall reevaluate make our corpus a cohesive entity whose questions may be taken as a starting point for new reflections. Simondon's philosophy of technics is a "work program"[2] in the sense that many of its problems are stated more than they are solved by the author.

1.1.1. *Simondonian functionalism*

For Simondon, the essence of technical objects lies in their technicity, and their technicity is functionality.

1.1.1.1. *The benefit of Simondonian functionalism by comparison with the utilitarian and hylomorphic conceptions*

The idea that technical objects should be understood in terms of their functionality is a radical claim that gives Simondon's analysis a particular status in the philosophy of technics.

Simondon is explicitly positioning himself relative to two classical schools of thought on technics. On the one hand, a tradition rooted in Aristotelian philosophy employs what Simondon describes as a "hylomorphic schema" to understand technical objects. The other approach follows the utilitarian and enframing conception of technics defended by Heidegger. Both define technics through the lens of the objects that it produces. In Aristotelian philosophy, the technical object is that which relates to the *tekhnê*. In *physics*, Aristotle distinguishes between *tekhnê* and *phusis* to establish the ontological superiority of natural facts. Although natural beings contain the principle of motion and rest within them "immediately and essentially" [ARI 73], the products of art and artificial objects essentially take on a contingent existence:

2 This expression was used by J.-Y. Chateau in *Technophobie et optimisme technologique moderne et contemporain* [CHA 94]. By analyzing the structure of MEOT, J.-Y. Chateau argues that the progression from local to global throughout the three parts of MEOT does not offer increasingly robust solutions but *clarifies the problem of technics increasingly robustly*.

> "They none of them have in themselves the source of their making, but in some cases, such as that of a house or anything else made by human hands, the source is in something else and external, whilst in others the source is in the thing, but not in the thing of itself, i.e. when the thing comes to be a cause to itself by virtue of concurrence" (*Physics*, II 1, 196b28–196b32) [ARI 73].

This shows the inherent meaning of the hylomorphic schema; the technical object is matter on which a human agent has imposed a frame from the outside[3]. Technical objects are not characterized by themselves (they belong to the wider class of artifacts, artificial objects); if they are, it is merely "by virtue of concurrence" (by accident). Their essence is only defined contingently.

PARALLELS TO KANT AND MARX.– The seeds of such a hylomorphic schema can be found in Kant's writings:

> "[It is true that] if, as sometimes happens when we search through a bog, we come across a piece of hewn wood, we say that it is a product of art, rather than of nature, i.e., that the cause which produced it was thinking of a purpose to which this object owes its form" [KAN 15, paragraph 43].

Similarly, for Marx: "[...] what distinguishes the worst architect from the best of bees is this, that the architect raises his structure in imagination before he erects it in reality" [MAR 68a].

The second schema from which Simondon distances himself is the utilitarian scheme; he calls this the "utensil" usage of technical objects. Here, Simondon is directly targeting Heidegger. In *The Question Concerning Technology*, Heidegger asserts that "the truth of the world of technics is found in a power that is not itself a technical reality" [CHA 94]. The enframing power of technics is independent of any

3 Thus, artifacts are "the things of which the form is in the soul of the artist" (*Metaphysics* Z 7, 1032 b) [ARI 00].

human will or power. It is "a device (*Einrichtung*), in Latin an *instrumentum*". The unity of technical objects arises by their relation to shared essence, the *Gestell* [HEI 58], which could be translated as the "device"[4]. Heidegger defines technics precisely by its lack of essence: "the essence of technology is by no means anything technological" [HEI 58]. At most, it is a symptom, a hint of the unveiling of metaphysics.

One aspect shared by the hylomorphic and utilitarian schools of thought is that they both define the essence of technics by the negative space around it – this essence is contingent, secondary; it does not exist for itself.

Departing from both approaches, Simondon attempts to give technical objects an essence that is intrinsic and irreducible; his approach provides a positive characterization of the concept. We wish to defend the hypothesis that the openness and positivity of Simondon's positioning enables reappropriation. It would seem that Simondon offers a suitable framework of thought for contemporary technics, whereas the two classical approaches unfold within a conceptual framework that is *a priori* excessively restrictive. We will seek to demonstrate in what ways Simondon's functionalism can be radicalized and validated *a posteriori* by confrontation with contemporary technical objects, where the two other theories appear to offer insufficient insight.

1.1.1.2. *A conception of the genesis of objects*

The technology[5] deployed in the first part of MEOT is a continuation of his primary thesis. It takes the heavy conceptual equipment of *L'individuation à la lumière des notions de formes et d'information* as a postulate. Thus, technical objects are "that which has a genesis". Simondon is not talking about a genesis in the general sense, but rather a specific genetic process: concretization, the

4 This is an alternative translation, as opposed to "enframing", which better reflects the original German term [JAN 85, p. 271, CHA 94].

5 For Simondon, technology is a discourse studying technical objects.

transition from an "abstract" analytic mode into a "concrete" mode. The concretized object is the solution of a problem; it is the entity that has prevailed against every obstacle and incompatibility inherently associated with its production. In practice, the technical object cannot be understand in terms of its current state, since it would otherwise be fundamentally indistinguishable from any other object. The test of whether an object is truly a technical object lies in the evolution of its functionality.

A technical object is not an object but rather the culmination in time of a lineage of functionality, its genesis. Thus, the technical object is equipped with a specific "mode of existence". Each technical object exists in the world in a particular manner that differs from that of human beings and biological life, possessing something which, according to the general perspective of Simondonian ontology, grants it a fully deserved ontological dignity: its own specific genetic process. To study the genesis of a technical object is to discover its specific mode of existence and thereby discover what constitutes its technicity[6]. For Simondon, anything that *functions* is a technical object.

TECHNICAL OBJECT AND MODE OF EXISTENCE.–

– A technical object is "that which has a genesis" [SIM 12, p. 20] "according to determinate modalities that distinguish the genesis of the technical object from that of other types of objects: the aesthetic object, the living being" [SIM 12, p. 20, footnote 1]. Simondon's entire body of philosophy concerns itself with establishing a general ontology founded on a genetic framework of thought. For more details on this topic, see [BAR 08b]; Simondon's encyclopedism seeks to unify knowledge into the process of genesis from which

6 This is the ambition of the first part of MEOT. The approach immediately resonates with ethical and political ramifications. It gives a concrete response, in the form of a method, to the initial call made in the introduction. There is a concrete development specific to technical objects, whereas the abstract object is the "physical translation of an intellectual system", the concrete object gradually gains independence from the act of its invention, realizing itself in the progressive synergy of its functions, to which humans adapt.

all of reality proceeds. For Barthélémy, Simondon's system is a "new genetic ontology of individuation". Each mode of existence is associated with a particular genesis. Placing MEOT within the context of this general ontology is therefore crucial; we defer to the work by Barthélémy on the topic, without repeating the specific questionings of Simondon's ontology and the coherence of his overall system (the conditions and limitations of the transposition from vital to technics and the status of the ontology as an "unfinished philosophy" are two examples of more global questions discussed by Barthélémy in the reference cited above). We shall restrict ourselves to the study of Simondon's philosophy of technics: the challenges that it raises and the method that it deploys.

– The notion of "mode of existence" itself originates from the philosopher Souriau, who has somewhat fallen into obscurity today. In 1943, Souriau wrote a book called *The Different Modes of Existence* (republished by *Les Presses universitaires de France* in 2009) [SOU 09]. The book argues the theory of existential pluralism: there are several ways to exist (including "super-existence" and "sub-existence"). Simondon adopts this idea. The third part of MEOT describes reality as unfolding from a unique mode of existence, the "magical mode," which can be subdivided into the "religious mode of being", which encompasses everything subjective, and the "technical mode of being", which encompasses everything objective [SIM 12, p. 160]. Thus, there are multiple modes of existence (giving rise to multiple frameworks of thought, including aesthetic thought and philosophical thought) and each must be observed in its own right. Incidentally, this shows how Simondon reduces the classical opposition between object and subject to delayed effects from the history, considered primitive, of modes of existence (see [SIM 12, p. 168] and the article by B. Latour on the notion of mode of existence [LAT 10], *Prendre le pli des techniques*).

This is why technicity, understood as functionality, is a broad concept that does not fully exhaust its reality in its objectivation. In

other words, technics is more than just technical objects, although technical objects offer a privileged prism for the analysis of technics[7].

Thus, Simondon studies two key aspects of technicity. First, via the study of "phylogenetic" heritage [SIM 12, Chapter 1]. The technical object is not the lamp in front of us, but the "unit of coming-into-being" [SIM 12, p. 20] that has evolved from start to finish into an increasingly coherent and functional lamp according to a movement of "functional synergy"; the object is evolving; we must study it diachronically. The technical object is not just the object before our eyes; it is the culmination, the fulfillment (provisional, if the system is not yet saturated) of an evolution specific to the object that is increasingly coherent with itself and with it surroundings. This is the process of technical concretization.

THE PHYLOGENETIC LINEAGE OF TECHNICAL OBJECTS.– In biology, phylogenetics is the science that studies the genesis of a species (phylogenesis), as opposed to ontogenesis or the genesis of the individual. Simondon exports this idea to the philosophy of technics; the "phylogenetic lineage" of a technical object is the entire development that has led up to this object, the genesis of its technical "type": the "temporal dimension of evolution" of the technical object [SIM 12, p. 66]. There are, however, differences specific to technical objects which Simondon heavily emphasizes. The phylogenetic lineage of the technical object is "not identical with biological evolution" [SIM 12, p. 66]. The difference is that technical evolution follows less "continuous" lines [SIM 12, p. 66] than biological evolution, since its elements are directly *detachable*, unlike the elements of biological evolution:

> "In the domain of life, an organ is not detachable from the species; in the technical domain, an element is detachable from the whole that produced it, precisely because it is

7 As observed by J.-P. Séris in *La technique* [SER 13]. The connections between Simondon and technical objects are discussed further in section 2.1.1.

> fabricated; and here, we see the difference between the *engendered* and the *produced*" [SIM 12, p. 67].

Technicity can then be studied by means of an analysis of scales[8], whereby the concretization of a technical object differs according to the level of technicity at which it is studied. There are three coexisting types of technicity: elements, individuals and ensembles.

These levels have also been used by classical analysis. An ensemble contains and coordinates several technical individuals, each of which allows several elements to function together, whereas "infra-individual technical objects can be called technical elements" [SIM 12, p. 65], an individual (e.g. machines from the industrial age) is "that which bears and directs tools" [SIM 12, pp. 78–80]; the ensemble is that "which contains all sub-ensembles" [SIM 12, p. 63]. As well as this interplay of different scales, there are also age trends; the technicity of a technical object gradually increases over time according to a process that unfolds at three levels:

– The first level is concretization, unfolding at the level of elements. As an element is concretized, it passes from a single function to several functions within the technical object (Simondon cites the cooling fin of a motor as an example; we will return to this example later): this is "plurifunctionality". The elements become increasingly dependent on one another. By means of the concretization of its elements, the technical object acquires a greater "internal resonance".

– The second level is individualization, occurring at the level of individuals; the machines of the industrial age are a typical example. The coherence of the technical object is reinforced not by any "internal resonance" but rather by "external resonance"; it develops a relationship of "mutual causality" with the associated milieu in which it is evolving[9].

8 Here, we defer to the illuminating analysis by Barthélémy [BAR 15] and his article "*Sur l'architectonique du mode d'existence des objets techniques*" [BAR 12b].

9 The associated milieu is "that through which the technical object conditions itself in its functioning" (pp. 56–57). The associated milieu is, by way of human intervention, the concretization of a "techno-geographic milieu". It is "the function of relating two

– The third level is naturalization. Here, the technical individual continues its individualization within technical systems that have themselves become the "associated milieu" of each technical individual.

The notion of "age trend" used by Barthélémy is explained by the fact that the ensemble, and the naturalization that occurs alongside it, is the predominant setting for technicity in MEOT. Technical normativity is historically found at the age of ensembles, which is also the age of information: "today, technicity tends to reside in ensembles" [SIM 12, p. 16].

This directly affects the resolution of the problem posed in the introduction of the book: technicity "[. . .] can become a foundation for culture, to which it will bring a unifying and stabilizing power, making culture adequate to the reality which it expresses and regulates" [SIM 12, p. 126].

Technicity can therefore be considered from several angles:

1) Above all else, it is functionality, as noted above. However, it is rarely defined in general terms in MEOT, with the exception of page 71, where Simondon gives a positive description: "Technicity is the degree of the object's concretization". On this page, Simondon further specifies: "The technicity of the object is thus more than a quality of its use; it is that which, within it, adds itself to a first determination given by the relation between form and matter".

Thus, from this perspective, technicity is that which is added to an object (assembly of matter and form). Technicity is increasingly

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milieus that are both evolving" (p. 53): a "mixed milieu", "technical and geographical" (p. 54). For example, in a locomotive, "the traction motor not only transforms electrical energy into mechanical energy; it applies it to a varied geographical world, which translates technically into the shape of the tracks, the variable resistance of the wind, the resistance of snow that the front of the locomotive pushes out of the way. The traction motors reaction rebounds on the line that feeds it, *creating a reaction that is the translation of this geographical and meteorological structure of the world*" [SIM 12, p. 53].

coherent functionality (which Simondon calls concretization) arising from both the initial act of human invention and the synergy between the components.

2) At the same time, technicity is *qualified* (used to characterize different scales: elements and ensembles) and is understood through the lens of age *trends*; thus, technicity "tends to reside in ensembles" according to MEOT [SIM 12, p. 16].

Beyond its functional aspect, technicity is therefore intrinsically linked to its position within the age trends of technics: according to MEOT, it is related to ensembles. But PST then questions this definition; while still accepting the framework of Simondonian technology as a starting point for analysis (genesis of objects, different scales and qualified technicity), thereby enabling comparison, PST modifies the definition of technicity by attributing its preponderance to another scale.

1.1.2. *The question of the localization of technicity*

Indeed, PST adopts a different point of view, that is the psychosocial method. It is not interested in the essence of technicity itself, instead seeking to characterize "a set of representations and attitudes toward technics"[10]. PST studies the object after it has been "liberated" it from its objective production and projected into social space – the object is no longer perceived as a technical object, but an object of use. From the psychosocial perspective, technics can be positively defined as "an activity of humans in a group, one that presupposes and incites representations, feelings, and voluntary movements".

To do this, psychosociology employs a particular prism of analysis with the objective of accounting for both individual (psychological) and collective (sociological) representations. The postulate of the psychosocial method is that to understand the relationship between

10 J.-Y. Chateau, introduction to PST [SIM 14d].

humans and their technical reality, neither pure psychology nor pure sociology can be satisfactory [SIM 13 pp. 315 and 534], since both approaches presuppose a substantial existence of the individual that can be separated from its social existence. Instead, starting from the principle that it is impossible to dissociate individuals and society, Simondon seeks to study the transindividual relations reflecting intrinsic connections between the individual and the collectivity[11]. The psychosocial method, much like the method of genetic technology, derives directly from the reality of its object. This is not an arbitrary choice; in the same way that technical objects naturally call for schemas to understand their functionality[12], which is not directly related to language, psychosocial reality is indifferent in its analysis of the individual and the collective, since relationships with technics are "phenomena that are simultaneously psychological and social" [MOS 84].

THE NOTION OF TRANSINDIVIDUAL.– Simondon defines the transindividual as follows:

> "Psychic and collective individuation are reciprocal to one another; they enable us to define the category of transindividual, which tends to account for the systematic unity between interior (psychic) individuation and exterior (collective) individuation. The psychosocial world of the transindividual is neither the raw social nor the interindividual; it presupposes a

11 In this regard, Simondon aligns with the historical tradition of French psychosociology, of which a lucid account was given by S. Moscovici a few years after the lecture on PST. According to S. Moscovici, the psychosocial method studies "the conflict between the individual and society" [SIM 13, p. 7], as well as "phenomena of ideology and communication". For S. Moscovici, the original contribution of psychosociology is to "question the separation of the individual from the collective, contest the division between the psychic and the social in the essential domains of human life" [MOS 84].

12 See section 1.2 on the Simondonian method.

> genuine operation of individuation from a pre-individual reality" [SIM 13, p. 29].

Thus, it is:

> "The being as a relation that is primitive and that must be considered principal; humans are social, psychosocial, psychic, somatic, but none of these aspects can be considered fundamental while judging the others accessory" [SIM 13, p. 297].

This echoes the rest of Simondon's ontology; we must adopt a "psychosociological" perspective of humans because "they are genetic and transindividual by nature" [SIM 14d]. Thus, "the psychosocial is transindividual" [SIM 14d, p. 303].

Simondon's psychoscoiology of technicity is therefore a method that aims to account for transindividual representations of technics. These representations are diverse and surround technicity with a psychosocial "halo" [SIM 14c].

This psychosocial method allows us to specify the problem posed by the introduction of MEOT in general terms more precisely: the divorce between technics and culture. Although MEOT gives an account of facts, PST gives a conceptual framework for understanding them.

The divorce between technique and culture manifests as phenomena of alienation of culture from technical objects[13]. Culture loses awareness of the technicity of the object by transforming it into an object of use and investing it with a meaning primarily determined by economic interests; the technical object is "ostracized". Simondon gives examples of opposing pairs to demonstrate this rift; he contrasts

13 And vice versa. The next few lines outline a general conceptual framework for the challenges of PST without going into the details of any of them, as an introduction to the question of the localization of technicity. The question of alienation via erroneous representations is discussed further in section 3.1.

the cryptotechnicity (objects whose technicity has been dissimulated) of the majority of technical objects with the phanerotechnicity (objects whose technicity is visible, manifest) of a few others – the former are accepted at the expense of the latter[14]. Similarly, the superhistoricity of an object is added to its primitive historicity (that of its conception) as soon as the object is purchased. For Simondon, the act of buying is synonymous with the alienation of the object, destroying awareness of its technical dimension.

The concept of closed/open objects follows a similar principle [SIM 14b, Chapter 2]. Simondon distinguishes between the open object, whose technicity is manifest, and the closed object, which is a black box that prevents people from "reading the operation of construction from within it". Although open objects permit an understanding of technical schemas and thereby allow imitation, closed objects sterilize any relations with the object; the closed object seals off its technicity once and for all, and promotes ignorance of its mechanisms. Closed objects are one of the causes of the divorce between technics and culture.

This theory of "open" industrial objects is a key aspect of the shift in the localization of technicity by comparison with MEOT. For an industrial object to be perpetually considered open, it must be the guarantor of mutually independent parts, each carrying perfectible technicity. Each "detached part" or element thus becomes a fundamental actor in this vision of technicity – since individuals at the industrial level are condemned to closedness. Moreover, this importance granted to elements has a secondary consequence, a constant relationship between the producer and the user via the

14 Pharenotechnical objects can also be accepted, but without providing knowledge of the technical object; when visible technicity is accepted, it tends to be more a "technophanic" perspective than a rational perspective (for example, demonstrating the power of a motor). This technophanicity is a path by which an ostracized technical object can recover, more or less, its place within a culture that has rejected it; it is both irrational and problematic (the object enters culture by "ritualization") but can nevertheless reintroduce the technical object into culture (via "neotenic" beings, technology amateurs, who might go on to develop a true interest in the technical object after this gateway has been opened).

networking of "depositaries possessing the needed parts". This rehabilitation of the element makes networking crucial: "There can be no true deployment of technical objects without the creation of a network of technicity" [SIM 14b, p. 69].

The psychosocial categories of analysis, which differ from the categories of the technology in MEOT, refine and enrich Simondon's vision of technicity. If we adopt the perspective of the openness of objects, "the element *and not the ensemble* is now the depositary of the power of openness" [SIM 14b, p. 68]. In other words, the potential to avoid the alienation of culture from its technical reality should be sought in elements, which are better protected from virtualization than individuals in the industrial age. The key to preventing the user from being completely disconnected from technical reality in an industrial age of closed objects polluted with "superhistoricity"[15] can be found in questions of scale. This is what Simondon is working toward. Granted, industrial objects are closed as objects of use; "the automobile or the television set are called upon to become closed at the level of the vehicle or device" [SIM 14b, p. 70]. But the closure of objects at the level of "the physical dimension of humans" (the "practical level of use"), namely the level of technical individuals, can be accompanied by an opening on two other levels:

– the scale of the "*microtechnics* of detached parts", namely the level of the element;

– the scale of the "*microtechnics* of distribution and exchange networks".

15 Simondon defines superhistoricity as "the exterior zone" of the technical object, at the level of "that which in a technical object is equivalent to clothing for a human" [SIM 14b, p. 58]. Historicity, by contrast, relates to the actual date of an invention and any "major" technical evolutions. The spread of superhistoricity has harmful consequences on the inherent technicity of technical objects: "The widespread existence of superhistoricity forces manufacturers to become producers of superhistoricity by regularly creating new models, thereby deliberately subdividing and occasionally delaying the structural reforms of true technical progress [SIM 14b, p. 58].

This represents a refinement of Simondon's earlier analysis regarding the preponderance of ensembles in MEOT[16]; the element-network pair is the guarantor of technicity rather than the ensemble. There is a "doubling of the scales of the media of technicity". Simondon thus succeeds in preserving industrial order from a psychosocial point of view: "when we seek the unity of culture, we should not therefore lament that industrial life is not at the human scale" [SIM 14b, p. 71], since the latter "liberates technical reality from being enslaved to the human scale" [SIM 14b, p. 71]. Thus, the unity of culture is saved by modifying the perspective originally adopted by MEOT, moving from the technicity of ensembles to the technicity of element-network pairs.

1.1.3. *The question of the representatives of technicity*

In its most general sense, Simondonian technicity is functionality. This generality enables us to locate technicity; Simondon establishes that, in the industrial age, technicity resides in networked elements. A third question concerning technicity raised by the comparison of both texts is the status of representatives of technicity.

In MEOT, Simondon asserts that the two paradigmatic schools of thought regarding the relationship between culture and technics are "incoherent with each other". This lack of coherence is "is partly responsible for the contradictions of contemporary culture, to the extent that it judges and represents the technical object in relation to man". The two paradigms are therefore in opposition; the impossibility

16 This is indeed a refinement of the analysis rather than a complete reversal or an internal contradiction in the author's ideas. In MEOT, Simondon characterizes elements as the source of the spread of technicity. Furthermore, the distinction between network and ensemble remains ambiguous; even though *a priori* they represent two different realities (L. Duhem also characterizes the network as the "fourth stage of technicity" [DUH 16]), it could be argued that the term of ensemble in MEOT was a less precise precursor of what PST (and later the lecture "*L'invention et le développement des techniques*" [SIM 05] from 1968 to 1969) characterizes as a networked technical reality. Thus, MEOT and PST are continuous rather than in dialectic opposition. This "continuistic" position was in particular defended by J.-Y. Chateau.

of reconciling them is partly responsible for the divorce between technics and culture. Moreover, this disjunction in representation has a corollary in the world of objects itself: "the condition of the disjunction between culture and technics resides in the disjunction that exists within the world of technics itself" [SIM 12, p. 87]. This passage echoes the dichotomy between open and closed technical objects analyzed in the second part of PST[17]; closed objects and their crytotechnicity are also responsible for a form of alienation of culture from real technics. The dichotomy of representations thus corresponds to a dichotomy of the functionality of objects; this dichotomy describes the alienation that is the primary focus of the entire Simondonian corpus. This is not just an economic alienation in the Marxian sense of the term, but a deeper alienation, one that must also be disarmed to destroy economic alienation; it is the alienation of individuals from their technical objects by way of their representations of these objects. But these representations are conditioned by the technical configuration of the objects. How can this deadlock be solved? We need adequate representatives of technicity, voices to speak for them. Simondon is looking for a "balance" but several questions are left unresolved. The analysis of MEOT presents the artisan as the bearer of closed, exclusive knowledge, assimilated with the figure of a child; the engineer is an adult bearing a flexible, non-rigid form of knowledge that is open to learning. The "rigidity" of the former contrasts with the "encyclopedism" of the latter[18]. MEOT thereby establishes a very clear hierarchy[19] in the relationship of engineers and artisans to technics. The criterion of his classification is the transfer of knowledge; the engineer is likely to pass on knowledge and hence reduce the divorce between culture and technics[20], whereas the artisan, enclosed within a

17 [SIM 14b] "*Objet technique ouvert et objet technique fermé*," p. 60 and following.

18 Simondon describes this opposition as symptomatic of a period in time, yet having existed forever; he then gives a lengthy historical discussion of the divorce between technicity and culture throughout history.

19 However, he does not question the "quantity of information" in the artisan's knowledge: "primitiveness cannot be confused with stupidity, any more than conceptualization with science" [SIM 12, p. 90].

20 The engineer is the vehicle of encyclopedism, the knowledge of rational signs and symbols.

"guild", cannot do the same. The knowledge of the artisan is "rigid" and it cannot evolve. Its characteristics are "of initiation and [...] exclusive", thereby intrinsically closed to the transfer of knowledge; this can be seen in the shift of the term "rigid" to the term "closure" to describe ancient technics[21]. MEOT thus establishes a typology that places the figures of artisan and engineer in opposition.

Simondon leaves open the question of who could be an adequate representative of technicity; the ideal mediator between technics and culture is not the engineer. For the sake of justice and balance, the author explains that "the prime condition for the incorporation of technical objects into culture would thus be for man to be neither inferior nor superior to technical objects" [SIM 12, p. 88]. Man should be capable of "approaching and getting to know them through entertaining a relation of equality with them, that is, a reciprocity of exchanges"; we must "discover an intermediary", a "representation that would incorporate both that of the craftsman and that of the engineer" [SIM 12, p. 88].

A reversal can be observed in PST. The status of the artisan is greatly redeemed. It is completely different from the status described in MEOT; artisans and engineers are both considered capable of producing open objects. The categories previously outlined by Simondon are superseded. Instead of "rigid" technical training, Simondon speaks of "adjustable and repairable" objects. The initial idea is preserved: the artisan described by both MEOT and PST entertains a privileged relationship with raw matter and benefits from an intuition of this matter. But this intuition of matter leads to the "closure" of ancient technics in MEOT, by contrast with the production of "open" objects with matter considered to be "reshapeable and extendable" in PST. The artisan is capable of producing objects with the same characteristic as specialized engineers: openness. The opposition is no longer found in the contrast between engineers who dominate their objects and artisans who are dominated by matter; from the perspective of these objects, the opposition is now located between

21 The artisan's technics are thus a "closed regime of life" [SIM 12, p. 90].

the mass-produced commercial object, closed and unknowable, deepening the alienation between culture and technics, and the open object, whether produced by an artisan or an advanced industrial process.

The "intermediary" sought by MEOT between the status of the artisan and that of the engineer is not yet resolved. The comparison of MEOT and PST yields two question. The first, inherent in MEOT and formulated as an open question, is that of the "balance" between the engineer's representation and that of the artisan. Perhaps this is nothing more than a delaying tactic in the argumentation of MEOT to gradually build up to the third part of the book as a climax, which draws from philosophy to justify the technology of earlier chapters. If so, we would choose a different path than Simondon, proposing to see technicians as the "balance" that Simondon fails to identify among the practitioners of technics. Comparing both texts reemphasizes this open question. The evolution of the status of the artisan in PST signals Simondon's hesitation and the question is left unresolved – the status of actors in the effective process of concretization of technical objects as mediators between technics and culture. We have therefore identified our first explicit line of inquiry – the "balance" between the representations of the artisan and the engineer. Another implicit line of inquiry, intersecting with the first, also arises from the confrontation of the two texts: what are adequate representations of an open technical object? What is the status of the artisan's representation, partially redeemed from its status in MEOT? How does the rehabilitation of the element and networking lead to a new vision of technicity and hence new representatives?

Clearly, contrasting the psychosocial method with the technology of MEOT results in fruitful questions. Working from a shared questioning (the relationship between technics and culture), this field of inquiry establishes several fragments of an answer that are complementary yet problematic. These fragments are obtained by different methods (the genetic method and the psychosocial method) that relate to different objects (the evolution of technical objects in themselves and their evolution within the social medium).

Simondon's philosophy of technics gradually establishes the question of technicity. It is by far the most radical of Simondon's efforts; it determines that the essence of technical objects lies in their functionality rather than their utensilicity or their artifactual nature.

Technicity is being examined in terms of its location and its representatives. Thus, we have identified the following two lines of inquiry from our corpus:

1) Does this new technicity, the "liberation of the element" which creates open objects, make sense against backgrounds other than the industrial system? More generally, how can we extend Simondon's philosophy of technicity using this idea of the "liberation of the element"?

2) What is an adequate representative of technicity, an "intermediary" between the artisan and the engineer, that would be suitable for our contemporary technicity?

Viewing Simondon's ideas as a work program in this way enables us to question contemporary technical objects. The author's follows a very specific path to examine technicity; we must explore this path before we can attempt to reproduce his gesture.

1.2. The Simondonian method: approaching the technical object as closely as possible

Simondon's method is the second focus of our work. The dialogue between Simondon and our digital technical object must be established according to certain well-defined criteria that we shall deduce from Simondon's approach.

Simondon's genetic technology is a feat of theoretical reversal. By refusing to take objects for granted, he rehabilitates them as elements of culture, as knowable elements – not like a work of artwork or a book, but nonetheless endowed with true *meaning* that has not yet been questioned frequently enough. Technicity can be studied by means of genetic investigation. Simondon gives some depth back to objects by

making each of them the location of a specific functionality process leading to a point of perfection that limits the inventive act crystallized within them.

1.2.1. *The epistemological stakes: an inductive method*

The Simondonian method is an extralinguistic act. It is a gesture that has been retranscribed; the philosophy of technics overflows from its philosophical (discursive and rational) perimeter to dive into a reality of functionality (that of technical objects). This venture beyond philosophy is the condition for producing an informed and accurate philosophy of technics – how can we expect to speak of something whose true content we do not know? Simondon initiates this gesture and calls for it to be replicated as an ethical task incumbent on the philosopher: to immerse oneself into unfamiliar domains of philosophy and deliver them to the reader and thereby heal the rift between technics and culture.

The method works by induction. Simondon directly references induction at the end of Chapter 1 of the first part of MEOT: "since the mode of existence of the concretized technical object is analogous to that of natural spontaneously produced objects, one can legitimately consider them as one would natural objects; in other words, one can submit them to *inductive study*" [SIM 12, pp. 47–48]. The method of studying technical objects by induction is directly derived from the method employed for natural objects in [SIM 13], which permitted an analysis of the process of individuation. Simondon gives an analogous reasoning to justify the transfer of this inductive method from the living to technics. The underlying connections of individuation (physical schemas) and individualization (technical schemas)[22] legitimize the application of the method of the primary thesis to the

22 See [SIM 07, p. 13]: "[...] the being in which individuation is unfolding is that in which a resolution appears by the distribution of being into phases, the coming-into-being: the coming-into-being is not a frame in which the being exists: it is a dimension of the being, the mode of regulation of an initial incompatibility, rich in potential. Individuation is the appearance of phases in the being, the phases of this being". There are clear similarities with the technology of MEOT presented above; as per Simondon's technology, technical objects are regularly assimilated with living beings.

secondary thesis. MEOT adopts both the postulate of genetic ontology and its method, since "technical concretization makes the primitively artificial object increasingly similar to a natural object". This analogy has a very specific purpose; it allows Simondon to extend the inductive method to MEOT. However, it does not allow a theoretical shift that would definitively associate technical objects with living objects.

Technical objects occupy "an intermediate place" between natural objects and scientific representations; they are neither fully natural nor fully human. This is where Simondon departs most radically from cybernetics, which tends to associate humans with technological schemas: "the initial postulate concerning the identity between living beings and self-regulating technical objects" [SIM 12, p. 49] is what risks undermining the work of cybernetics. Simondon nuances this: "One mustn't confuse the tendency toward concretization with the status of entirely concrete existence" [SIM 12, p. 49]. He is not going "right to the limit"; the analogous reasoning between individuation and individualization allows the inductive method to be transferred from one to the other and gives them a shared framework of study; it does not allow us to "speak of technical objects as if they were natural objects"[23]. The inductive method is therefore imported from the primary thesis via an analogous reasoning whose scope is precisely outlined by Simondon; we cannot extrapolate the analogy to the point of identity, as professed by cyberneticians.

Although some past commentaries have discussed the induction of the primary thesis, none of them have focused on the mechanisms of induction in MEOT itself [SIM 12, p. 49].

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23 J.-H. Barthélémy observes that this was inspired by Bachelard in [BAR 08b]. The title of the opening chapter of the cited book is "The 'realism of relations': epistemological preliminaries" – which incidentally demonstrates the importance of epistemology when studying Simondon. Barthélémy explains that physics has a philosophical scope that permits an ontology to form from the teaching of physics. The desubstantialization of contemporary physics (which finds its roots in Einstein's relativity, thermodynamics and quantum physics) and the "realism of the relations" that are derived from it are the source of the antisubstantialist claims at the heart of Simondon's genetic ontology of individuation.

1.2.2. *Case study of a technological example*

Indeed, past analysis of the epistemology of technology has remained general in scope, without ever directly targeting the inductive method of MEOT.

Commentators have tended to ignore the concrete developments of each example; they tend to cite the concluding remarks without showing the developments which built up to them; they appeal to the conclusions without displaying the paths that led to them[24].

To make space for the inductive approach, we propose to perform a structural analysis of the technology deployed by Simondon.

We will briefly analyze the argumentation from an example in the first part of MEOT. The same procedure is followed throughout the rest of the first part and other writings on technics[25].

Thus, in "Genesis of the technical object: the process of concretization" [SIM 12, Part I, Chapter I, on the lineage of technical objects] and "Evolution of technical reality; element, individual, ensemble" [SIM 12, Part I, Chapter II, on the scales of technicity], the examples are drawn upon by the text as arguments, enabling a gradual increase in generality within the technological discourse.

Although the discussion in the introduction of MEOT remains general in scope, the functionality of objects is already mentioned at the start of Chapter I, subject to a concrete and precise materiality. Examples are strongly present throughout the first part; the space granted to them within the argumentation increases quantitatively and the presentation of a single example reaches up to three full pages[26].

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24 There are occasional exceptions, e.g. Chabot [CHA 03].

25 MEOT uses this argumentative strategy from beginning to end; to a lesser extent, so does PST and many other of Simondon's texts, such as the collection *L'invention dans les techniques* [SIM 05] or the texts in *Sur la technique* [SIM 14b].

26 See MEOT, p. 19, and pp. 20–21 and 23 (two-and-a-half pages on the phylogenetic lineage of gasoline engines), pp. 25–26 (on the cooling of internal combustion engines to illustrate the level of abstraction of technical objects), pp. 28–30 (on the evolution

Let us consider the first few pages of MEOT to illustrate this method. The first section of the first chapter, "Genesis of the technical object: the process of concretization", subtitled "The abstract technical object and the concrete technical object", discusses the concretization process with a technical example spanning three full pages. The technicity of the selected object, the gasoline engine, is presented down to the tiniest details, and arguments that lead to the idea of concretization are gradually introduced, finally restating this idea in clear terms in the final two sentences of the section.

Simondon begins by asserting that technical objects are "subject to genesis" [SIM 12, p. 19] while maintaining that simply describing this genesis is not sufficient to understand it. He states his method; rather than starting from the "the individuality of the technical object, or even with its specificity, which is very unstable" (starting postulate), we must instead "reverse the problem" by studying the "criteria of [the object's] genesis". The object is then defined as a "unit of coming-into-being" [SIM 12, p. 19]. The genetic study of technical objects is therefore postulated theoretically.

The example of the gasoline engine is cited immediately after this to support the philosophical position taken by the text:

> "The gasoline engine is not this or that engine given in time and space, but the fact that there is a succession, a continuity that runs through the first engines to those we currently know and which are still evolving" [SIM 12, p. 19].

After introducing this example, the discussion rises to a greater level of theoretical generality. The notion of "phylogenetic lineage" is introduced as an index of comparison, and the genesis of the object is

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from electronic tubes with radio lamps to show how evolution proceeds by leaps and bounds), p. 32 (on the transition from the Crookes tube to the Coolidge tube to illustrate the specialization of functional units within the concretization process). There are various other examples, all following the same argumentative procedure, up until the end of the second part of the book [SIM 12].

defined more precisely: "the technical being evolves through convergence and self-adaptation" [SIM 12, p. 20]. This assertion is immediately illustrated with a technical example by comparing the engines of the 1910s against the engines of "today" (1960s). The example reinforces the point that the engine is not defined by the fact that it is used as an engine, but because it is the location of a specific technical process. Even if it were used for something completely different, it would still be an engine by nature. A very concrete technical example is then given to emphasize even further the variety of different engines. Simondon switches into technical language, speaking of "galling", "rod bearing failure", "ignition"; the theory of concretization is demonstrated: "in a contemporary engine each important item is so well-connected to the others via reciprocal exchanges of energy that it cannot be anything other than what it is" [SIM 12, p. 21]. Another supporting example references the "shape of the combustion chamber" and the shape of the "valves" of the "piston" [SIM 12, p. 21].

The functionality of the engine corroborates Simondon's theory of concretization more effectively than a discursive, logical argument. The terms of "abstract" and "concrete" used earlier to announce the structure of Chapter 1[27] reappear in the main text during the presentation of the technical example: "One could say that the contemporary engine is a concrete engine, whereas the old engine is an abstract engine" [SIM 12, p. 21]. The two primordial concepts of Simondonian technology are introduced for the first time in an example, providing the induction from a specific technical example to the general theory of technology.

The example of an engine emphasizes the concrete engine as a factor of technical progress. To support his position, Simondon analyzes two models of engine separated across time through the lens of a particular technical problem: cooling fins. The older engine is the result of a search for compromise. Its cooling fins are "defense structures" that are "as if added from the outside" to the overall structure, and their sole purpose is

27 The title of the first section is "The abstract technical object and the concrete technical object".

cooling; they serve "only one function". By contrast, a "convergence of functions" is visible in the modern engine; here, the cooling fins are not limited to the single role of cooling; they also play a "mechanical role" [SIM 12, p. 22] within the ensemble, making them indispensable (if they are removed, not only will the engine stop being cooled, it will be unable to continue functioning). The elements are interdependent; the cylinder head is now dependent on the fins. The object is more concrete and more self-coherent. During his technical presentation, Simondon prepares his final conclusion by saying that "the development of this unique structure is not a compromise, but a concomitance and a convergence". He also gives a summary of the entire discussion: "The technical problem is thus one of the *convergence of functions into a structural unit*, rather than one of seeking a compromise between conflicting requirements" [SIM 12, p. 22].

Simondon also allows for the existence of "mixed" cases, identified as a "residue of abstraction" [SIM 12, p. 22] within the technical object. Here, the technical object serves both as an argument for and an *objection* against the Simondonian theory. The objection is raised by the functionality of the technical object itself; concretization is not always perfect. The theory of concretization acknowledges this and accepts the resulting nuance, becoming less unilateral in doing so.

The lengthy discussion of gasoline engines, spanning several pages, culminates in a very concise summary recapitulating the theory of concretization:

> "The technical object thus exists as a specific type obtained at the end of a convergent series. This series goes from the abstract to the concrete mode: it tends toward a state which would turn the technical being into a system that is entirely coherent within itself and entirely unified" [SIM 12, p. 23].

Simondon employs the same argumentative strategy throughout the entire first part of the book. His theory is gradually refined by a series of "objections" emitted by the functionality of technical objects themselves (such as the "mixed" adaptive case resulting in a "residue of abstraction") chip away at its apparent mass. In the Simondonian

method, these mechanical schemas serve as an epistemological thread on which a genetic ontology of technical objects is founded[28].

1.2.3. *Reproducing the Simondonian gesture*

Technical objects have argumentative value; this is the Simondonian method, the path that we shall take in our attempt to extend the author's thoughts. The method is not beyond reproach; the panel of technical objects studied by the author consists primarily of machines. Can the method be extended by applying it to a digital object? Does it provide acceptable frameworks of understanding in such a case, or is it only suitable for material objects? We shall answer this question by applying the frameworks of the Simondonian method defined above to analyze a free software program. Our analysis will:

– adopt the same general schemas of Simondonian technology as stated and implemented in MEOT, namely (1) analysis of the phylogenetic lineage of the object and (2) analysis of the degrees of technicity present within the object (element, individual and ensemble);

– consider the *argumentative value* of the functionality of the technical object; this object might produce *objections* for the theory examining it.

Simondon's philosophy, beyond its genetic and metaphysical scope, contains a fundamental gesture. Simondon's entire body of work enters into a dialogue with the introduction of MEOT. According to Simondon, philosophy must reconcile culture and technics, and to do this, it must deploy a method of analysis that integrates technical objects and endows them with argumentative value in their own right – as much as any theory would. This is demonstrated at the end of Chapter 1, where the statement of the inductive method is directly linked to the unveiling of Simondon's technology program. This is also the key connection between Simondon and encyclopedism; the author

28 Just as the "realism of relations" derived from physics had allowed the process of individualization to be established in his primary thesis.

embodies the model of a bridge between culture and technics, extending the one pursued by the disciples of *L'Encyclopédie*.

Simondon's philosophy of technics is a work program because it asks questions about the conception of a functionalist technicity and because it presents a specific method. It is both a framework of thought and a gesture that must be extended. Accordingly, we decided to consider a contemporary numerical object and precisely describe certain aspects of its functionality; in doing so, we are giving this object a voice. The conceptual framework is now in place for a dialogue between the philosophy of Simondonian technics and the software program. We shall see how the software and its functionality puts the philosophy of Simondonian technics and its functional definition of technicity to the test.

1.3. Confronting Simondon's thoughts with computers

> "By choosing to examine the philosophical meaning of the computer, I therefore wish to prove Simondon right beyond the technical objects that he considered in his own time" [BAR 07].

1.3.1. *Existing work on Simondon and computers*

Before applying the Simondonian philosophy of technics to a digital object, let us review what has already been written on this subject. We shall see that interpretations of Simondon operate under a certain number of unspoken assumptions.

Just as past authors have not taken interest in the technical explanations themselves and how they are used (Simondon is considered original by virtue of his *object* but not his *method*), the Simondonian gesture has not been replicated. In fact, the most inclined to reapply such a method are engineers rather than philosophers, for whom praxis is typically not a strength. The article "*Simondon et l'ordinateur*" by Barthélémy offers a paradigm for this approach; it calls for a reevaluation of the Simondonian philosophy of technics

relative to Feenberg's social constructivism. Interestingly, according to the author, this reevaluation should not be performed by a commentary of any particular text by Simondon, but by studying a concrete technical object. Praxis and the technical object are returned to the foreground to dialogue with Simondon's philosophy. Barthélémy calls for a study of the concrete object of a computer, although without consciously discussing the theory underlying his approach. The epistemological shift is not explicitly noted anywhere, namely that it is not deeper knowledge of any particular text of the author or comparison with other authors that would improve our understanding. Instead, we should seek a renewed confrontation with a contemporary technical object, or in other words we should *apply the Simondonian method*. The conditions of this confrontation are not stated or detailed. Once again, it is largely a question of anticipating its theoretical consequences, without yet giving a voice to the technical object – this responsibility is left to future generations of researchers armed with a robust toolset of Simondonian commentary.

Following this call, some authors performed an analysis of Simondon to understand the field of computer science. Several noteworthy approaches were developed, and we shall specify our positioning with respect to each of them below.

The most general effort to theorize Simondon and networks was arguably made by L. Duhem, whose work [DUH 17] very precisely defines conditions for building a framework of thought for digital objects based on Simondon. His appearance at a seminar in Cerisy[29] presents a broad perspective on Simondonian questions and offers great clarity regarding the unspoken Simondonian assumptions that derive from them. The approach taken by L. Duhem revolves around networking as the central – perhaps ultimate – concept of Simondon's ideas. He inserts Simondon's genesis of technical objects into an increasingly tight networking process. However, elements are only connected to themselves, technical individuals connect the elements

29 "*La réticulation du monde*" [DUH 16] in *Gilbert Simondon ou l'invention du futur* [BON 16a].

and their associated milieu, and at an even higher level, ensembles are themselves networks of technical individuals. Technics gradually complexifies its relations; its progressive organization is described by L. Duhem as "a world of networks". It tends to become "a network of networks both independent and articulated around the natural and human network" [DUH 16]. Thus, for L. Duhem, the final phase of the evolution of technical objects (not mentioned in MEOT[30]) is that of networks. The networked reality, in the words of Simondon, establishes "technicity in a pure state" [SIM 05].

L. Duhem emphasizes the importance of the concept of network within Simondon's philosophy as the final stage of technicity; nevertheless, he is careful not to prematurely assimilate that which he calls the "post-industrial technical network", in which Simondon places his hopes, with the Internet. He simply clarifies the concept, clearly stating the threads that must still be pulled to "build the Internet into a paradigm of worldwide networking". The philosophical approach, like Simondon himself, must follow paths that are strictly technical to be entitled to establish a framework of thought for the entirety of networked reality (and its broad connections with the theorization imagined by Simondon). Thus, before embracing too superficial of an analogy, Duhem argues that contemporary researchers should examine two cardinal points that are "internal" to the networked object of a computer:

– analysis of the particular "information machine" that is a computer;

– analysis of the language of computers.

These two points, identified by L. Duhem but not explored in any further depth, offer an outline of an investigation that would probe increasingly deeply into an analysis of the networked technical

30 As noted above, MEOT clearly places the essence of technicity in the era of technical ensembles. Among other things, PST revisits this claim by focusing on networks. This theoretical shift is even more clearly visible in the collection of texts *L'invention dans les techniques* on which L. Duhem bases his position.

individual. Our raw philosophical intuition of networked contemporary reality (inspired by Simondon's thoughts on the subject, some 50 years earlier, unfamiliar with the technical objects that are contemporary for us) is immediately succeeded by the necessity to verify this intuition. To do this, the program outlined by L. Duhem appears to return to the less networked levels of technicity, which form an integral part of the global networking of technical objects. He first calls for an analysis of an object that seems to largely fit the description of a technical individual, namely the computer, followed by an analysis of the components of this computer, i.e. computer code.

These reflections echo three contributions to the round-table discussion on "*Simondon et l'informatique*" at the same seminar in Cerisy. Each speaker agrees; Simondon's thoughts, even if they do not directly target computers, nonetheless contain "threads" for studying the field of computer science.

F. Pascal [PAS 16] observes that computer science is a "scaffolding of networks" and invokes the cardinal distinction of computers, that is of *hardware* and *software*[31]. On the one hand, a network is "system for supplying power, transforming and distributing energy, and its refinement into a complex electronic system of integrated semi-conductors" (*hardware*, the electronic aspect); on the other hand, it is "a cascade of multiple coding systems implemented by distinct communities" (*software*, the software aspect). These two networks do not simply coexist; they are connected and interdependent; thus, "the environment of software can in many ways be questioned through its relation with hardware".

J. Grosman [GRO 16] gives a few fundamental ideas for studying computers through the lens of Simondonian concepts. He begins by recalling the importance of information theory for Simondon, who sought to reinvent it to make it more universal. Grosman suggests that this offers a way of examining computer code, understood not as "a set of lines written in a programming language" but as a "set of

31 See the glossary, "Opposition between hardware/software".

instructions and values directly corresponding to significant voltage differences in the machine".

Programming enables us to reduce the "margin of indeterminacy" of the open machine. In other words, "programming is what allows us to temporarily restrict the form of the machine from among its originally planned variations of form".

At this point, the figure of a hacker enters the picture, which J. Grosman contrasts with the technician described by Simondon, noting that they are not the same; hackers are associated with the idea of bricolage ("there is also a dimension of bricolage in hackers"), whereas technicians are not. Here, J. Grosman outlines a tension between the ideas of technicity and finality by comparing the paradigms of the machine-tool and the computer, the open machine. Computer code is understood as a privileged link between man and machine through a renewed theory of information.

The second point raised by J. Grosman relates to the notion of technical schema, or more generally the concept of technicity. J. Grosman proposes that technicity is an open concept, free to evolve, and that the criteria of concretization are no longer fully adequate for electronic and computer systems – we need to derive new criteria from close contact with computer objects. We need new technical schemas on which to formulate a reflexive and philosophical framework of thought: "the knowledge of individuation is inseparable from the individuation of knowledge".

Finally, J. Grosman encourages the reproduction of the Simondonian gesture. To understand computers, we must make ourselves available to this new technical object and its schemas of functionality. By understanding it from the inside, we can formulate ideas that, without this gesture *outside of philosophical and conceptual thought*, could not have entered the reflexive and linguistic field. J. Grosman reminds us that the essence of the Simondonian method is to remove ourselves from philosophy to speak other languages, then, armed with the experience thus gained, seek to convey these new modes of reflection in philosophical language.

A few observations emerge from this brief overview. Important groundwork has been laid for understanding Simondon and computers. This preliminary work justifies the direction of our own study. Some preliminary ideas have already been identified in Simondon's work, although they have not been addressed directly:

– his theory of networks;

– his vision of information theory, which starts from a critique of automata and seeks to distance itself from Wiener's theory. The difference between an automaton and a machine is the margin of indeterminacy, which enables the latter to receive information (the automaton, a stable and predetermined individual, cannot receive information[32]; conversely, only a metastable individual with a localized margin of indeterminacy can receive information and transform its structure);

– this notion of margin of indeterminacy leads to certain ideas regarding computer code. The machine restructures itself, reorganizes itself according to the information supplied to it: "Programming is what allows us to temporarily restrict the form of the machine from among its originally planned variations of form".

The possibility of an open relationship between the calculating machine and the technician thus begins to take form. Humans become the interpreters of machines, entering into a synergy with them; there is a coupling between the human and the machine "when a single and complete function is performed by two beings" [SIM 14b, p. 173]. In the context of computers, this functional synergy might be realized by the intermediary of computer code.

32 On this topic, J. Grosman mentions a comparison by Simondon: "The example of the automaton itself is the Leibnizian monad, based on the paradigm of a pendulum whose future is controlled by a divine clockmaker. For Simondon, its stability characterizes the impossibility of the transformation of the system, of its future". The concept of margin of indeterminacy is crucial for the rest of our study; we shall revisit this concept in the second part.

Simondon's theory therefore contains hidden intuitions that deserve to be further extended – the works cited above were presented at a round-table discussion; to date, no publication has been exclusively dedicated to studying Simondon and computers.

1.3.2. *The positioning of our study*

Following in the footsteps of existing work on the connections between Simondon and computers, our own study will position itself at several levels.

First, we aim to achieve more than simply identifying the parallels between the characteristics of technicity for Simondon and a contemporary object; to truly follow the Simondonian method to the full extent of its radicalism, we owe it to ourselves to truly discover and understand the technical object that we are studying – so that we can give an account of it in philosophical terms. The methodological stance that we have chosen is that of a dialogue between the theory and the concrete object.

Furthermore, it seems to us that the F. Pascal's distinction between hardware and software is fundamental. Our inquiry will not begin with the material aspect of the technical object of a computer (hardware), but with the digital object of a software program[33]. It is not self-evident that software can be viewed as a technical object within the framework of Simondon's theory. Given that software consists of binary information and lines of code, is it possible to effectively establish connections with the Simondonian theory, which pertains to material and concrete machines? The second part of our study will attempt to resolve some of the difficulties associated with this line of questioning: is a software program a technical object?

To answer this question, we will use the conceptual tools presented in the first section, defined earlier as characteristic of the Simondonian philosophy of technics:

33 Choosing to start from the immaterial object of software program does not prevent us from considering the underlying hardware.

– The Simondonian method: we shall study a particular digital object, a software program. Our analysis will primarily focus on software in the general sense. To examine certain more precise technical aspects, we have chosen to consider the open source browser Mozilla Firefox[34]. By following the guiding threads provided by the method, we will see the mutual contributions between the Simondonian theory and the digital object.

– Can the digital object be considered as a technical object using the conceptual frameworks of the Simondonian philosophy of technics established earlier (Chapter 2)? What challenges does this definition hold in relation to Simondon's philosophy of technics?

– Conversely, can the Simondonian philosophy of technics answers the questions that it has left open? We have identified two key lines of questioning: the localization of technicity and the representatives of technicity. If we successfully identify the software program as a technical object, this object will provide new answers to these two questions (Chapter 3).

34 This choice is explained in section 2.1.