

Form and Relation. Materialism on an Uncanny Stage

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ABSTRACT. This article seeks a materialism that is largely ignored in current philosophical discussion, which originates from speculation on the materiality of forms. Following the critique of Simondon and Heidegger, this article rejects hylomorphism which gives substantiality to forms rather than matter; at the same time, this proposition also wants to distinguish itself from the current proposals of a return to matter, such as the vibrant matter of Jane Bennett or the principle of factuality of Quentin Meillassoux, by outlining a genealogy of the material conditions for the individuation of forms. The article endeavours to understand the evolution of the concept of form in different stages of technological development: crafts, machines, technological systems exemplified by the web. The article suggests that the materiality of form is not only thinkable, but also necessary for the development of a speculative metaphysics and critical theory of machines.

Keywords: Materialism, digital objects, forms, Simondon, Heidegger.

RÉSUMÉ. Forme et relation – L'inquiétante étrangeté de la scène du matérialisme. Cet article entend chercher un matérialisme largement ignoré dans les discussions philosophiques actuelles, qui tire son origine de spéculations sur la matérialité des formes. En suivant la critique de Simondon et de Heidegger, il rejette l'hylémorphisme en raison de la priorité qu'il accorde une forme pure et abstraite en dehors de la matière ; de même, il se distingue des propositions actuelles qui valorisent un retour à la matière, à l'image de la matière vibrante de Jane Bennett ou du principe de factualité de Quentin Meillassoux, en esquissant une généalogie des conditions matérielle de l'individuation des formes. Cet article s'efforce de comprendre l'évolution du concept de forme au fil des différentes étapes du développement technique : artisanal, machinique ou systémique (au sens des systèmes technologiques), tel qu'exemplifié par le Web. Au fond il entend suggérer qu'une pensée de la matérialité des formes n'est pas seulement concevable mais également et surtout nécessaire au développement d'une métaphysique spéculative et d'une théorie critique des machines.

Mots-clés : Matérialisme, objet numérique, formes, Simondon, Heidegger.:

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“Once, as I was walking through the deserted streets of a provincial town in Italy which was strange to me, on a hot summer afternoon, I found myself in a quarter the character of which could not long remain in doubt. Nothing but painted women were to be seen at the windows of the small houses, and I hastened to leave the narrow street at the next turning. But after having wandered about for a while without being directed, I suddenly found myself back in the same street, where my presence was now beginning to excite attention. I hurried away once more, but only to arrive yet a third time by devious paths in the same place. Now, however, a feeling overcame me which I can only describe as uncanny...”

(Sigmund Freud, The “Uncanny”, 1919)

INTRODUCTION

In this famous text titled *The Uncanny* Freud sought to address the question of aesthetics by exploring the meaning of the uncanny. Aesthetics, as Freud wrote at the beginning of the essay, is about feelings and sensations rather than beauty. *Heimlich* means something familiar, as if one is at home; on the contrary *unheimlich* means feeling like not being at home. Freud wanted to extend the interpretation of *Unheimliche* in a more profound manner, which he found in Schelling's understanding, something that “has remained hidden and secret, and yet comes to light”. After passing the same street three times, the feeling of uncanny grows because of the repetition of a certain intensity. The scene became familiar, something came to light, but remaining hidden there made him nervous. Freud finds many examples in storytelling including writings from Hoffmann, Shakespeare, etc, since they often create an uncanny atmosphere pervaded with familiar figures and spectres.

The hiddenness is present in the objects themselves, in the situation of the uncanny, they reveal something beyond the phenomenal experience, like “coming to light” [*Lichtung*]. This hiddenness of things also constitutes the manifold of their phenomenal appearance [*Erscheinung*], since it is in the privation of the hiddenness that the object shows itself as such. In this manifoldness, we can identify the constant self-actualisation of what is still hidden as the movement of materialisation¹. We can observe this in the example of light analysed by modern physics, in which we are told that there are multiple levels of realities or orders of magnitudes: light, waves, particles. The self-actualisation of the hiddenness demands a material and technical condition, for example the apparatus used for measurement (double-slits – in the case of wave) and electron microscope. In the revelations, we find the uncanniness of things. This aspect gives us an entrance into the psychoanalysis of things, of materials, as Gaston Bachelard showed in his treatises on fire, soil,

¹ I deliberately contrast the word *Unheimlich* of Freud with the vocabularies to which Martin Heidegger paid a lot of attention such as *Lichtung*, *Erscheinung*, in order to prepare a departure to a metaphysical enquiry on materiality.

wind and water. For example, the multiplicity of the poetic images of water manifests in ocean, rivers, canals, streams according to different geographical location and season. We may want to ask: where does this hiddenness come from and how does it manifest? Can we find this manifestation in the form or in the matter according to the ancient metaphysics? Or shall we find this understanding in the assemblage theory proposed by the modern metaphysics?

FORM AND INDIVIDUATION

In his *Categories*, Aristotle proposes to understand being in terms of substance and accident. Aristotle says: “that which is called a substance most strictly primarily and most of all – is that which is neither said of a subject nor in a subject, e.g. the individual man or the individual horse.”² Substance itself is the subject. Accidents are the predicates of the subject. Clearly in *Categories*, Aristotle designates the subject-predicates pairing both as a grammatical structure and as a system of classification. The relation between language as classification and things as physical beings is already established: the primary substance in *Categories* remains a universal ‘this’. Aristotle gives a more detailed, while somewhat divergent account of substance in *Metaphysics (book Z)*, where he says that the question “what is being?” really amounts to “what is substance?”³. He then proposes to understand the substance of the substratum. The substratum can be described in terms of sensible form and matter. Sensible form is concerned with ‘what kind of thing’ it is, and matter concerns ‘what it is made of’. Aristotle proposes to decide which of the three elements – form, or matter, or the composite of form and matter – can be called substance. Aristotle rejected matter and compound, the first because it can be a predicate of the subject, and the second because it is “posterior in nature and familiar to sense.”⁴ He finally decided that form is the sole understanding of substratum. Sensible forms raise the question of essence; they give identity to matter.

“And since one element is formula and one is matter, contrarieties which are in the formula make a difference in species, but those which are in the compound material thing do not make one. Therefore, whiteness in man, or blackness, does not make one, nor is there a difference in species between the white man and the black man, not even if each of them is denoted by one word. For man plays the part of matter, and matter does not make a difference; for it does not make individual men species of men, though the flesh and bones of which this man and that man consist are other. The compound thing is other, but not other in species, because in the formula there is contrariety. And this is the ultimate indivisible kind (atomon). Callias is formula together with matter; white man,

² Aristotle, *Categories*. In Jonathan Barnes (ed.) *The Complete Works of Aristotle*. Trans. J.L. Ackrill. Princeton: Princeton University Press, 1984, 2a13-2a18, p. 4.

³ Aristotle, *Metaphysics*, John Marrington (ed. and trans.), London, Melbourne & Toronto: Everyman’s Library, 1956, p. 168.

⁴ Aristotle, *Metaphysics*, p. 172.

then, is also, because Callias is a white man; man then is white only incidentally.⁵

This hylomorphism elaborated by Aristotle as above, leads to two lines of critique in modern philosophy. The first critique centres on the separation between form and matter as the understanding of objects; the second critique wants to reverse the privilege of form over matter, and give it to matter. The first type of critique, we will see later in the theories of Heidegger and Simondon, which sees form and matter separation as a simplistic and naïve understanding of existence. We can see the second type of critique in the new emerging branch of philosophy under the title *New materialism*, featuring philosophers such as Quentin Meillassoux, Karen Barad, Jane Bennett, Manuel DeLanda; most of them are inspired by Spinoza, Gilles Deleuze, Henri Bergson, Bruno Latour, etc. These theorists have different notion of materialism, I would like to single out here the works of Jane Bennett and Quentin Meillassoux. Bennett proposed the concept of vibrant matter. The vital materialism suggests the return to object and finds there the hidden power that has been always overlooked:

“Why advocate the vitality of matter? Because my hunch is that the image of dead or thoroughly instrumentalized matter feeds human hubris and our earth-destroying fantasies of conquest and consumption. It does so by preventing us from detecting (seeing, hearing, smelling, tasting, feeling) a fuller range of the nonhuman powers circulating around and within human bodies. These material powers, which can aid or destroy, enrich or disable, ennoble or degrade us, in any case call for our attentiveness, or even "respect" (provided that the term be stretched beyond its Kantian sense)”⁶.

Bennett's materialism is situated in the forces manifested within the objects and the assemblage in which they take part. It wants to get rid of the subject-observer and object-observed configuration. This new materialism that wants to go “back to things themselves” is a new metaphysical approach that tries to avoid this subject-object correlationism present in phenomenological tradition (for which we count also Hume, Kant, Husserl and his successors). Meillassoux has clearly expressed this critique in *After Finitude* and other essays. In contrast to what he calls the “facticity of correlation” [*facticité de corrélation*] of the correlationist tradition, he proposed what he calls the “principle of factuality” [*principe de factualité*], meaning to identify a reality or a materialism which is independent from thought: “we propose to make the facticity no longer the index of a limitation of thought of its incapability to discover the ultimate reason of things, but the index of a capacity of thought to discover the absolute non-reason (*irraison*) of all the thing.” This materialism affirms the absolute of the existence of matter.

⁵ Quoted by Jeremy Kirby, *Aristotle's metaphysics: form, matter, and identity*, Continuum, 2008, from Aristotle, *Metaphysics* x9 (1058b1–11).

⁶ *Vibrant Matter a Political Ecology of Things*, Duke University Press, 2010, Preface, ix.

⁷ Quentin Meillassoux, *Métaphysique, spéculation, corrélation*, in *Ce peu d'espace autour. Six essais sur la métaphysique et ses limites*, réunis par Bernard Mabille. Chatou: Les Éditions de la Transparence, 2010. I would like to thank Monsieur Meillassoux for generously sending me his manuscript.

Without following the lines of inquiry of 1) pure form; 2) vital matter; 3) assemblage, I would like to suggest in this article another line of thought, which, it seems to me, has been under-explored in the current philosophical investigations. I want to call it *the materiality of forms*. The immediate question that arises is: how can we account for the materiality of forms, if it is not simply an expression of the matter (that is to say form is not material, but rather expression)? I would like to affirm that forms can be considered as expressions, but I also want to reject that they are pure expressions. Thinking of forms as pure form (external to matter) or as pure expression (of matter) ignores the fact that forms demand a certain kind of force or power to secure and maintain privilege, especially when we consider how form resists the change of identity due to external forces.

To talk about the materiality of form is not only to understand form in terms of its material support, but also to understand the individuation of form that presents in itself materially. We know that forms demand a material support, for example the form of a circle can only be fully understood through its drawing on a paper; the concept of a brick has to be mediated by the mould which gives form to it. This approach to understand form through its supplement, which we can name the technique of deconstruction in the sense of Jacques Derrida, problematizes the concept of the pure form, without effectively clarifying the new mode of existence of things⁸. Since it will still need to explain form from matter, as we can see in Bennett's vibrant materiality. On the other hand, the pure form immediately opposes being with becoming, and it is not able to explain, as Gilbert Simondon says, individuation. Forms according to Simondon are already individuated. This individuality is confirmed by its material support, while the passage from the preindividual to individual, namely individuation, cannot be accounted for by an abstract assemblage nor by the already individuated matter, but rather a concrete operation at the same time *material*, *energetic* and *informational* (generally non-immanent)⁹.

The etymology of *Mât* means to make by hand, to measure, to construct, which has to do with matter, but it is also more than matter in terms of its physical constitution. *The materiality comes from the resolution of tensions in and between multiple levels of realities*. This return to the question of form risks accusation of going back to the hylemorphism of the ancients, but I would like to reassure that this speculation is not a return to hylemorphism, but rather announces its end. My question is, will it be possible to analyse the materiality of form? For if we can trace the materiality of form, while not leaving it entirely to its material support, we can probably open a window peeping into a new approach towards materialism. Here, I want to put forward a general definition of the material condition of individuation of form (to be distinct from energetic and informational) as synthesis of relations, which become more and more concrete and explicit in the technological progress.

⁸ This can be understood in parallel to what Bernard Stiegler said about deconstruction, namely there is hardly critique of ontology in the philosophy of Derrida, but only deconstruction of ontology.

⁹ Simondon, *L'individuation à la lumière des notions de forme et d'information*. Grenoble: Éditions Jérôme Millon, 2005, p. 79

TECHNICS AND RELATIONS

The ignorance of the materiality of form has two sources, the first comes from the opposition between form and matter. It consequently identifies materiality with matter, and there is no materiality for form. The second source comes out of the ignorance of technical objects – the intuitive application of the form and matter hylemorphism, in metaphysical investigations. I tend to think that technical objects had rarely received attention from philosophers until the first half of the 20th century, actualised in the works of Heidegger and Simondon. To be sure, I am not saying that philosophy of technics or machines didn't exist until the 20th century, but rather that nature or more precisely natural objects had been the dominant objects of investigation. Machine tools are often naturalized as natural objects, that is to say, they give us the phenomenological experience but not what lies beyond the phenomenon. A metaphysical (non-theological) treatment of machine, other than Heidegger's critique of the essence of technology as *Gestell*, seems absent. Hence in the analysis of this article, I will restrict our attention to technical objects in order to unfold what I call the materiality of forms.

The evolution of technical objects, I will argue, is the evolution of forms that is reflected by a materiality which supports it and is present in itself. I want to show that eventually hylemorphism has dissolved itself and the notion of form can only be thought in terms of relations. This approach towards form and relations gives a new notion of materiality and perhaps a new speculative materialism. The critiques of substantialism and hylemorphism in the 20th century are largely driven by the development in science and technology. For example, as shown by Gaston Bachelard, substantialism cannot explain microphysics. Bachelard proposed to replace the word substance with “existence”, since substance is useless and dangerous¹⁰. Bachelard's new epistemology centres on the concept of relations. These relations will actualize according to certain technics or instruments of observation. In his article *Le Monde comme Caprice et miniature* (1931), Bachelard wrote “in the beginning was relation” [*au commencement était la relation*]¹¹. Bachelard also considered this new way of looking at things through relations a task and challenge for metaphysics:

“It is in this pellicle that relations with the exterior determine a new physico-chemistry. It is there the metaphysician could understand the best how the relation determines the structure.”¹²

Bachelard's approach borrowed its critical force from quantic physics, rejecting both hylemorphism and substantialism. This critique can be sublated into upper levels of realities, for example in technical objects. Simondon's concept of the individuation of living beings as well as the individualisation of technical objects are firmly grounded on relations. These relations are not for

¹⁰ Dominique Lecourt, *L'épistémologie historique de Gaston Bachelard*. Paris: Vrin, 2002, p. 25.

¹¹ Lecourt, *L'épistémologie historique de Gaston Bachelard*. Paris: Vrin, 2001, p. 25.

¹² Gaston Bachelard, *Le nouvel esprit scientifique*.

http://classiques.uqac.ca/classiques/bachelard_gaston/nouvel_esprit_scientifique/nouvel_esprit.pdf, p. 129.

him tensions. In the individualisation of technical objects we can also see a constant process of materialisation that serves as a technical dimension in addition to psychic and collective individuation. In the third part of *Du Mode d'Existence des objets techniques*, Gilbert Simondon developed a meta-history of technology development which departs from a primitive magical moment. Simondon showed that philosophical thoughts must be posed as efforts that try to reunite the bifurcations from the primitive magical moment. In ancient time, magic is pre-technological and pre-religious. There is no distinction between subjects and objects, as Simondon puts it:

“The magic mode of relation to the world is not one that is lacking in organisation: on the contrary, it is rich in implicit organisation that is attached to the world not being devoid of organisation.” (216, MEOT)

In this structuralisation, there emerged the distinctions between figure and ground. But they couple with each other, that is to say the figure is the figure of the ground and the ground is the ground of the figure. There existed singular points such as certain places and moments which exhibited magical powers that bring human and world together. These places and moments becomes hubs or what Simondon called key points [*les points clefs*] of reticulation. As Simondon said, these key points operate at a distance, as if the forces could exert from afar. The rupture happened when the front was detached from the ground, objects separated from subjects. In this instant, we observe two directions first the subjectification of the ground in religion, then objectification of the figure in technology. Technical objects detached from the ground traverse geometrical spaces and function in whatever place and whatever time before it becomes obsolete in terms of technicity. The will to universalize displayed by technical objects requires new relations that connect objects or different part of the ensemble of technical objects together; in this process, we can see that relations no longer work on distance as magic power, but contacts and steps:

“At the same time, the key points lose their mutual reticulation and their power to influence from distance the reality that encompass them; they, like technical objects, only *have an action by contact, point by point, instant by instant*. This rupture of the network of key points frees the characters of the ground, which in turn detach from their own ground...(italics are mine)”

There is a process of materialisation of imaginary/mediative relations in technical objects, technical systems. This doesn't mean that we are charging Simondon as a materialist, in fact, Simondon has a very strict (somewhat narrow) understanding of materialism. For him materialism has the tendency to reduce the complex to simplicity; materialism wants to show that the superior of living beings can come out of the inferior of material beings. I want to show rather how materialisation of relations constitutes a perpetual movement and evolution of forms. Form demands this materiality through the evolution of technologies. What is significant is the position of philosophical thoughts proposed by Simondon at the end of *Du mode d'existence des objets techniques*. Simondon understood it as the effort to reunite these bifurcations.

Forms are actualized according to the new relations that are materialized. In machines for example, we find relations such as physical contacts between wheels, pulleys, chains, etc. Under such a condition, Simondon is able to present us with a technical individual, which is an ensemble of relations actualized in a way that is able to restore its equilibrium, *i.e.* metastability.

In parallel, the development of technology itself also exposed us to the problematic of hylemorphism, which was once its principle. I took this motivation largely from Jean-François Lyotard's discourse of the postmodern, which is concretely expressed in the exhibition *Les Immatériaux* held at the Centre Pompidou in 1985. Lyotard showed how the modern vision and conception of technology, when it came to the advancement of communication technologies, expresses the poverty of its vision. This is to say, technics negates the will that drives and produces a new form of materiality, also a new condition of interacting and becoming. The title of the exhibition "*Les Immatériaux*" designates something opposite to its literal meaning; it is not the immaterial but rather the new material. In order to approach our proposition, I would like to outline a trajectory of the materiality of forms through three *dialectics* – crafts, machines and technical system. The materiality of form acts like a spectre in its perpetual process of materialisation and escape. I want to show by the end, how Web technologies – as we are speaking of the philosophy of the Web here – characterize the final stage of technical system and a new materiality/materialism which cannot be entirely conceptualized as vibrant material, nor simply under the title assemblage.

CRAFTS

We start with craft, since it is where one can situate the first critique of hylemorphism: the first stage of productive metaphysics. We can find it in the critique delivered by Martin Heidegger, who opposes bringing and producing. The artisans or craftsmen, when they are making the craft, for example, do not fix a form on the material, instead they allow the form to appear by itself. There is a particular way of seeing, in which visual and haptic senses couple together. We can find this in Heidegger's interpretation of the four causalities proposed by Aristotle:

“(1) the *causa materialis*, the material, the matter out of which, for example, a silver chalice is made; (2) the *causa formalis*, the form, the shape into which the material enters; (3) the *causa finalis*, the end, for example, the sacrificial rite in relation to which the chalice required is determined as to its form and matter; (4) the *causa efficiens*, which brings about the effect that is the finished, actual chalice, in this instance, the silversmith¹³.”

This bringing forward into presence is *poiesis* in Greek, or *hervorbringen* in German. Heidegger continues ‘Bringing forth comes to pass only in so far as something concealed comes into unconcealment. This coming rests and moves freely within what we call revealing [*das Entbergen*]. The Greek has the word

¹³ Martin Heidegger, “The Question Concerning Technology”, in *Question Concerning Technology and other Essays*, Harper Perennial, 1982, p. 281

Aletheia for revealing'. Technics brings the object poietically into appearance, into a world, which in turns conditions the relationship between human beings and their world. The first generation technicians/artists are those who expose to the manifestation of truth, *Aletheia*, hence they are also the gatekeepers or the shepherds of beings. But in the four causes, we already discovered the separation between form and matter. This separation constitutes the powerful hylemorphism which conquers our intuition. Forms are imposed on matter in order to determine its being. In the previous example of the silver chalice, where visual and haptic senses are both present in the process of making, the artisans bring the objects into presence; but in the form imposition practices, abstract thinking precedes the process of making. This transition is what Heidegger calls forgetting.

We should also note that form constitutes not the final cause but the second cause of this production. Form comes out of the care of the craftsman, the matter he is working with. But why is it this form but not another form? These forms are given by the mediative thinkings, or mediative relations between the craftsman, matter and his imagination of the product to appear. That is to say that form is at the same time material and imaginative. It is relevant to recall Gaston Bachelard's distinction between two types of imagination, one is formal imagination, for example images in poetry; another one is material imagination, that finds its ground in material, like water, fire, air, soil. All formal imaginations, or imagination that rely on forms must find their source in materials. In *L'eau et les rêves*, after introducing the axis of materialising imagination (*l'imagination matérialisante*), Bachelard wrote "for such a meta-poetic, water is not only a *group* of images known in a roving contemplation, in a succession of fragmented, instant dreams; it is a *support* of images and soon a *supply* (*apport*) of images, a principle that found the images"¹⁴. The final cause is not independent from the formal cause, nor is the formal cause independent from the other causes.

The imaginative relations are slowly eliminated and passed into material relations, which favours its mechanical reproducibility. That is to say forms gained their new materialities through these relations that allow new forms of reticulation. With mechanical reproductivity, the poetic dimension of manual labour slowly disappears. In *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit*, Walter Benjamin calls the authenticity that originated from the hand of the artisans and craftsmen 'aura'. While form is transferred from hands to machines, form becomes indifferent to matter. The negotiation between mediative relations is replaced by forces of different forms [temperature, pressure, etc]. We see another compensation here from Benjamin: mechanical reproduction compensates for the weakness of the craftsman's technological immaturity. The disappearance of aura is at the same time the celebration of technological advancement.

"melting [*Guß*] and stamping [*Prägung*]. Bronzes, terracottas, and coins were the only art works which they could produce [*hergestellt*] in scale. All others were singular and could not be mechanically reproduced. With the woodcut, graphic art

¹⁴ G. Bachelard, *L'eau et les rêves*. Paris: Librairie José Corti, 1942, p. 18.

became mechanically reproducible for the first time, long before script became reproducible by print. The tremendous changes which printing, the mechanical reproduction of writing, have brought about in literature are already well-known¹⁵.”

MACHINES

Heidegger and Benjamin are almost opposing each other here since Heidegger proposes the emergence of form as the process of *hervor-bringen*; while Benjamin see the materiality of form in the process of *her-stellen*, which compensate the poetics or even the pretext of *vorher-bringen*. Aura, as aesthetics, was also the effort to drag back the spirit that is on the point of departure. The materiality of form in the age of mechanical reproducibility was released from a bodily operation, and “reached a standard”¹⁶. The mechanical reproducibility risks the loss of aura, but it shifts from the mediative circuit to the physical contacts, as evidenced in cinema (light and film, contact of gears, etc.) where the world is re-modulated through new forms. Consequently, machines become the interpreter or mediator of the language of forms, i.e. the realisation of an abstract thinking of forms. The abstract thinking is characterized by the acquisition of a mathematical language. In the *Engineers of the Renaissance*, Bertrand Gille portraits the renaissance engineer as ‘an artist and artisan, a military man, an organizer of festivals, a man of such complexity and genius that it seemed that no effect was beyond his powers’¹⁷. Yet, a fundamental change was also happening at that time. Descartes and Fermat set a new beginning to abstract thinking. As a consequence, formal training in mathematics became necessary. The French architect and historian Antoine Picon confirmed it as a shift from geometrical rationality to analytical rationality¹⁸. Picon also observed that engineers no longer defined themselves ‘through the mastering of purely geometrical knowledge, as designers or as “artist engineers” closely related to architects. They created for that purpose a new science, involving the use of calculus’¹⁹. The analytic method is not limited to mathematics but rather to a broader sense of ‘rational decomposition and recomposition’.

The consequences of this language of forms were fully expressed and raised to a philosophical height in the Encyclopaedia edited by Dennis Diderot and Jean d’Alembert. One of the goals of the encyclopaedia is to ‘publish all the secrets of manufacturing’²⁰. In the 17 folio letterpress volumes of the

¹⁵ Walter Benjamin, *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit*, in *Ein Lesebuch*, Suhrkamp, 1996, p. 314.

¹⁶ *Ibid*, p. 315.

¹⁷ Bertrand Gille, *The Renaissance engineers*, London: Lund Humphries, 1966, p. 10.

¹⁸ Antoine Picon, *Towards a History of Technological Thought*, <http://www.gsd.harvard.edu/images/content/5/3/537913/fac-pub-picon-history-technological-thought.pdf>

¹⁹ Picon, *ibid*.

²⁰ John R. Pannabecker, Diderot, the Mechanical Arts, and the Encyclopedie: in Search of the Heritage of Technology Education. *Journal of Technology Education*, 6-1, Fall 1994. The other two goals are a) to reach a large public; b) to encourage research at all stages of production.

encyclopaedia, about 2,900 plates in 11 folio volumes were devoted to technology. Diderot was trying to defend the mechanical arts, which was understood to be inferior to liberal art including philosophy, in his entry on ART in the encyclopaedia, Diderot asked:

“In what physical or metaphysical system do we find more intelligence, discernment, and consistency than in the machines for drawing gold or making stockings, and in the frames of the braid-makers, the gauze-makers, the drapers, or the silk workers? What mathematical demonstration is more complex than the mechanism of certain clocks or the different operators to which we submit the fibre of hemp or the chrysalis of the silkworm before obtaining a thread with which we can weave? [...] I could never enumerate all the marvels that amaze anyone who looks at factories, unless his eyes are closed by prejudice or stupidity.”²¹

In effort to discover the significance of technics, Diderot’s Encyclopaedia delivered two important messages. Firstly, the triumph of mechanical art, which is conceived as a system of technical knowledge, or more precisely a general grammar that conditions reasoning. At the opening of the encyclopaedia Diderot and d’Alembert describe a tree structure that constitutes human knowledge. The tree consists of three parts: Memory, Reason and Imagination. All these three parts of human knowledge are conditioned by different skills, for example under the category of memory, we can find the gold drawing and diamond cutting, etc. The arrangement of the encyclopaedia itself is presented as a machine. Secondly, as soon as the industrialisation or standardisation of forms has started, the age of the craftsman is gone. The working process is mediated by machines that were present as abstract beings, system of knowledge that constitutes the inexperience of human being. The sociologist Richard Sennett wrote ‘Only a generation after the Encyclopaedia appeared, Adam Smith had concluded that machines would indeed end the project of enlightenment, declaring in *The Wealth of Nations* that in a factory “the man whose whole life is spent in performing a few simple operations [...] generally becomes as stupid and ignorant as it is possible for a human creature to become.”²²

TECHNOLOGICAL SYSTEMS

Forms also started to become dispersed in a larger milieu, in which a technical object can no longer be perceived as the product of a simple form acting on matter. Since its materiality allows it to extend from domains to domains, by being connected through different relations. Simondon was at the front line of criticizing the insufficiency of understanding technical objects through hylemorphism. Simondon suggests that despite hylemorphism being insufficient to account for current technological production it is still nevertheless an intuitive thought that remains a dominant engineering

²¹ Denis Diderot, ART/Encyclopaedia In Charles Harrison & Paul Wood (eds.) *Art in Theory, 1648-1815: an Anthology of Changing Ideas*, Volume 1 Oxford: Blackwell, 2000, p. 585.

²² Richard Sennett, *The Craftsman*. Yale University Press, 2009, 105.

principle. These forms (inventions) are “*non omnis moriar*”²³, even though they become obsolete but they never die completely. However in contrast to this conception of form as the ultimate force of production, Simondon suggests that a tool “is not made of matter and form only. It is made up of technical elements arranged from a certain system of usage and assembled into a stable structure by the manufacturing process.”²⁴ Despite it being the age of mass production, the machinic process cannot be fully explained by hylemorphism. The identity of a technical object is tantamount to the totality of its production, as opposed to its form and matter. Simondon puts this in a rather extreme way: “There would be no exaggeration in saying that the quality of a simple needle expresses the degree of perfection of a nation’s industry.”²⁵ This marks the departure from the individual determined by form to a broader discourse of systematic determination. Indeed both processes point to what Simondon calls the ‘historical singularity’; production itself is always the product of a historical moment distributed throughout the entire technical ensemble²⁶.

If we observe the production of a needle in a factory at the time when Simondon wrote about it (1940s-1950s), we can see that in fact the needle was really produced from a mould. What we can understand is that a technical object does not have a simple form but rather multiple forms that consist in a multiplicity of relations. Forms are consequences of the synthesis of relations acted on by certain determinations. Yet, in the time when Simondon talked more about technical ensembles instead of technical systems, we can imagine that forms are heterogeneous, dispersing in different technical ensembles or infrastructures. The materiality of these forms allows different parts of the object, or different objects, to be connected. Indeed, it is only through the sharing of forms that different machines can work together. Partly based on reading of Simondon's *Du mode d'existence des objets techniques*, Ellul took up the progress from objects to ensembles, sub-system and then to systems:

“The technological object, becoming detachable, can be grouped with other technological objects according to such and such an arrangement: the technological world offers an indefinite availability of groupings and connections [...]. Constructing a technological object means preparing an availability: the industrial grouping is not the only one to be realized with technological objects—we can also realize non-productive groupings, whose goal is to attach man to nature through a regulated concatenation of organized mediations, to create a coupling between human thought and nature. The

²³ Simondon, *Imagination et invention*. Éditions de la Transparence, 2008, p. 164.

²⁴ Simondon, *On the Mode of Existence of Technical Objects*, trans. Ninian Mellamphy. London: University of Western Ontario, 1980, p. 62.

²⁵ Simondon, *On the Mode of Existence of Technical Objects*, p. 85.

²⁶ A remark has to be put here: this seems to drag us back to the assemblage theory that we wanted to differ from the beginning. The difference that we need to distinguish is the difference between an assemblage and a system. A system is an assemblage consists of different technical objects, but an assemblage is not necessarily a system.

technological world intervenes here as a system of convertibility.”²⁷

Ellul proposes that in order to study a specific technology, we cannot take it only as tool but should rather approach it as a technological system²⁸. We need to explain a little bit more about this concept of technical system. The current English translation of Ellul's *Le Système Technicien* is technological system. I use the term technological system instead of the technical system, since for Ellul it designates a certain historical moment, instead of a general concept as what we can trace in the technical milieu of André Leroi-Gourhan or technical system of Bertrand Gille. A technological system does not simply group its elements together in a random manner; they follow certain causalities and constitute their own totality. The technological system evolves according to its own logic as though it had a kind of existence in itself. Technology is gradually ‘organizing itself as a closed world,’²⁹ and the process also eliminates non-technical factors.³⁰ Ellul wrote: “The technological system is a qualitatively different phenomenon from an addition of multiple technologies and objects. We cannot absolutely understand them if we consider them separately or isolate one field of action from technology; we have to study them inside of, and in terms of, the overall technological system.”³¹

This technological system, as Ellul remarked, only fully realized at the time of computer. To Ellul, these computers organize the technological system and create a new reality. Written at the beginning of 1980s, Ellul did not employ the term ‘digitalization’, instead he uses ‘computerization’. Ellul sees that it is the technology of data processing that makes the technological system possible. We can imagine during the course of writing this book, database technologies started to emerge, computational machines began to be widely used for administration purposes. Data is the significant word or concept that pushes the question of forms further. How is this language of form developed and conceived today? The computers, the Internet, the Web, etc., are compositions of protocols – standards. In fact if we look at the success of the Web, we can identify a certain genealogy of: SGML – HTML – XML – Ontologies. HTML is a subset of SGML, but with a fixed DTD. The motivation behind HTML, following the SGML, was partly a political move, as SGML was the dominant protocol at that time. In saying that, however, let’s immediately note that its separating content and form also demonstrated a technological significance. Berners-Lee wrote that “an architectural rule which the SGML community embraced is the separation of form and content. It is an essential part of Web architecture, making possible the independence of the device mentioned above, and greatly aiding the processing and analysis.”³² The rise of the Web from the 90s and to the population of the semantic Web since

²⁷ Jacques Ellul, *The Technological System*. Continuum, 1980, p. 83

²⁸ Ellul, *The Technological System*. Continuum, 1980, p. 82.

²⁹ Ellul, *The Technological System*, p. 230.

³⁰ Ellul, *The Technological System*, p. 234.

³¹ Ellul, *The Technological System*, p. 89.

³² Tim Berners-Lee, *Web Architecture from 50,000 feet*, <http://www.w3.org/DesignIssues/Architecture.html> (accessed 24 March, 2014)

the 2000s, present us, as I would like to suggest, with the latest stage of the development of data technics. This materiality no longer finds itself in the physical contacts of gears, the contact of electrons, but rather the abstraction of data. The materiality of form finds its ultimate expression as quantifiable relations that allow automation – we can see from the following example of the representation of social relations using the ontology Friend of a Friend (FOAF). To give an example, to find the relation between, say, me and Bertrand Russell is much easier since the ontology FOAF already indicates that Heidegger is associated with Bertrand Russell. Also the use of SPARQL, a query language, makes information extraction easy.³³

```

<rdf:RDF xmlns:rdf='http://www.w3.org/1999/02/22-rdf-syntax-ns#'
  xmlns:rdfs='http://www.w3.org/2000/01/rdf-schema#'
  xmlns:foaf='http://xmlns.com/foaf/0.1/'>
  <foaf:Person>
    <foaf:name>Martin Heidegger</foaf:name>
    <foaf:firstName>Martin</foaf:firstName>
    <foaf:surname>Heidegger</foaf:surname>

    <foaf:mbox_sha1sum>71b88e951cb5f07518d69e5bb49a45100fbc3ca5</foaf:mbox_sha1sum>
    <foaf:knows rdf:resource='#russell'>
  </foaf:Person>
  <foaf:Person rdf:ID='russell'>
    <foaf:name>Bertrand Russell</foaf:name>

    <foaf:mbox_sha1sum>241021fb0e6289f92815fc210f9e9137262c252e</foaf:mbox_sha1sum>
    <rdfs:seeAlso
      rdf:resource='http://rdfweb.org/people/brussell/foaf.rdf'/>
  </foaf:Person>
</rdf:RDF>

```

Figure 1

An example expresses personal information and friendship in FOAF

This move also separates what I call digital objects and technical objects (in the sense of Simondon)³⁴. A digital object is bounded by data and metadata as

³³ Peter Mika, *Social Network and the Semantic Web*. Springer, 2007, p. 61.

³⁴ See Yuk Hui, What is a Digital Objects? *Metaphilosophy*, 46.

shown in the above FOAF example. Metadata schemes or Web ontologies are forms that determine the appearance and the relations of the objects. The determined relations are made possible by the general form of Mark-up formats such as RDF (Resource Definition Frameworks, which we may want to consider as form of forms, that designates another level of abstraction). In the reality of the Web, digital objects are at the same time forms and material relations supported by strings, characters, numbers (there are different realities, downwards, such as binary codes, signals, voltage differences, etc). Within the Web, relations are sublated [*aufgehoben*] to a higher level of reality (compared with mediative relations, mechanical and mathematical relations). Relations are not only found within forms, we can also say that forms have become relations in the technological system that render operations compatible (this consists in what I call interobjectivity³⁵) and digital objects are able to exist on and are communicated between different apparatus.

CONCLUSION

The above exposition attempts to show several different conceptions of form by situating it on different levels of technical realities (as well as materialities). In each level of technical reality, we can see different processes of individuation of forms. What is hidden yet open – the uncanny – shows different concealments and openness in different realities³⁶. They probably should not be read as *ontological* questions, but rather *ontogenesis*. The reading from crafts to machines and finally to technological systems, underlies three technical realities and the approach to understand the materiality of forms through the synthesis of relations (1. it doesn't mean that there are only three technical realities; 2. these examples are far from being complete, I didn't even mention electronic applicants and the relations between different elements such as diodes, triodes, as Simondon demonstrated often in this writing on technical objects, that are indispensable for the technological system).

In crafts, we see the individuation of forms through the resolution of mediative relations that could be found between hands and different tools, and the material of production. Passing to machines, mediative relations are displaced by formal relations, expressed in terms of physical contacts between gears, cables, wheels; these relations are also actualisations of mathematical relations – we could say a meta-form; we can find this from engineering of the renaissance to Turing's universal machine. The third individuation of form finds its materiality in digital writings. Form serves as the definition of digital objects as well as those relations that constitute the coherence of the system. In digital objects, relations are becoming more and more concrete and explicit. The existence of digital objects is constituted by the materialized milieu which gives it an identity, which does not come from the “matter” (considering a Youtube video), nor from the imposition of form, but by the relations *in it*, *created by it*, and that *surround it*. After all, we have to recognize that the

³⁵ See Yuk Hui, Deduktion, Induktion und Transduktion - über Medienästhetik und Digitale Objekte, in *Zeitschrift für Medienwissenschaft* (April,2013).

³⁶ We can contrast this to the analysis of Heidegger, who didn't analyse the question of concealment according to different realities.

materiality of form cannot be fully accounted for by the abstract notion of matter or the concrete material that the object is composed of. For example, a digital object and its relation to other objects cannot be explained by its representation on the screen of digital devices, neither by signals, or voltage differences. This materiality seems to come from elsewhere (a different reality or order of magnitude). We can perhaps say that the relation between a natural object and atoms is analogous to that between a digital object and digitized relations, these relations are material as well as conceptual. The materialism that I tried to outline above is not a general principle, but rather a self-actualisation, always on the move, in which we can trace a genealogy of the material condition of the individuation of forms. The uncanny, as explained by Schelling as something that “has remained hidden and secret, and yet comes to light”, is the play or even dialectics of the visible and invisible, the *noumenon* and the *phenomenon*, mediated through the search of the absolute of the technical progress.

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