Lecture Notes in Morphogenesis
*Series Editor:* Alessandro Sarti

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# Morphogenesis and Individuation

Springer

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# Foreword

This volume, 'Morphogenesis and Individuation', aims to build on the categories and conceptual tools used in the morphogenetic approaches through a discussion of Gilbert Simondon's work. Simondon's philosophical perspectives on science were further developed in René Thom's mature analysis. Key-concepts as information, metastability and individuation opened new issues for discussion. In particular, even though Thom's concept of morphodynamics provided a topologic categorisation of the spatio-temporal configurations, it left several problems open, such as the constitution of singularities starting from a multiplicity of elements, as well as the genesis and evolution of the space of control, that in Thom's approach is a priori given. The category of *individuation* plays an important role in Thom's framework, explaining the relationships between *saliencies,* i.e. perceived Gestalts, and what he calls a *prégnance,* a biological or physical signification which an organism, for innate or conditioned reasons, may ascribe to such salient forms—cf. Bundgaard and Stjernfelt (2010). Nevertheless, he admits that the issue of the individuation of a general *prégnance* is obscure, leaving only conjectural hypotheses—cf. Thom (1991).

For this reason, a closer look at the concept of individuation in Simondon's work provides the opportunity for new research and developments in different areas, and could provide a unitary framework for disciplines interested in perception, vision, language, anthropology, semiotics and cultural studies.

Thom (1968) applied morphogenetic models to the morphodynamic development of syntax. The laws of form generation and stability lead to simple archetypes that link language with our experience of the environment, semiotics, biology, culture and nature. These models describe meaning through different manners of capturing salient objects by pregnant 'capture devices'. This concept of morphology was further developed by Wildgen (1982).

The issue of the individuation of singular *prégnances* from a general one was posed by Thom in terms of the generation of the four base-relations between actants starting from the hysteresis cycle—cf. Thom (1989, 1991). The relation between the individuation of a general prégnance and the archetypal syntax recalls Greimas' distinction between fundamental and narrative syntax—cf. Greimas and

Courtés (1979)—suggesting a mathematical model that generates both of them. The boundaries between Semiotics and Morphogenetic approaches has also been analysed by Petitot (2003).

Thom's concepts of individuation and metastability are related to Simondon's work. However, compared to Simondon's concept of individuation, Thom's models seem too deterministic. A study of the organisational and perceptual faculties of living beings, of their topologic and functional plasticity, and their complex behaviour should avoid the mechanistic, deterministic and reductionist perspectives that have been popular in the last 50 years. The morphogenetic perspective, instead, could establish a new fruitful research direction by reconsidering the Simondonian concept of individuation, and its relationship to indetermination and identity. This could lead to a non-deterministic approach to meaning construction, a new way to address the link between local and global processes, as well as describe phenomena in their diachronic variation.

Simondon's work on individuation (2005) indicates a way for forms to find an internal consistency and to become actualized. Simondon considers information processes as the acquisition of form, generated by the metastability of the system. Individuation is a movement of resonance and internal reconfiguration in which signals and messages connect heterogeneous pre-individual differences, integrating their resonances and thus generating global differences. Naturally, individuation is always an incomplete and partial process, a variable network of both pre-individual and singular features.

Simondon considered certain key-concepts the starting point for a possible axiomatisation of a general epistemology for the human sciences: form, information, potential, transduction—cf. 'introduction' in Simondon (1989). 'Form' is an active principle that operates on matter. Nevertheless, in Simondon's perspective matter is not entirely passive. Matter is seen as a force field in which the *germ* of the form can propagate thanks to the metastable state of the matter. The matter is the locus of the potentials, and the boundary between form and matter is an amplifier signal. The propagation of the form is called 'transduction'. Thus, Simondon reforms Aristotle's old ileomorphic schema by introducing a morphodynamical perspective. Simondon's perspective is very different from Thom's. As Andrea Bardin underlines in his paper, the starting point of Simondon's model is not the catastrophic segmentation of an original continuum, but the propagation of singular discontinuities.

It is important to distinguish between the different possible metastable states, which are responsible for the possibility of a hierarchy of good forms, and the stable state, which coincides with death. In the stable state no more changes are possible in this system without the intervention of external energies. Using this definition Simondon associates systems with a certain degree of (meta)stability.

With this model in mind, Simondon conducts a philosophical shift. He considers 'individuation' a resolution starting from a metastable state. In other terms, he does not try to explain 'individuation' starting from the individual. He does not take the existence of well-delimited individuals for granted (each one with its 'haecceitas'), as we find in philosophy from the middle-ages. Thanks to the fact that we can

distinguish different degrees of stability and chaos, we can investigate the individual through the dynamics of individuation, starting from a pre-individual reality. The individual preserves its original bounds within the pre-individual and can never be considered an isolated monad. On the contrary, the collective, trans-individual dimension is already inscribed onto the individual.

This is why it is impossible to think about the individuation process using classical logic. Principles such as the Law of identity and of excluded-middle, already imply well individuated objects—Simondon finds an alternative in Quantum theory.

Simondon's work had important resonance in different fields due to his attempt to reformulate ontogenesis, not in mere individual terms, but as the becoming of being. In epistemological terms, this forced human sciences to integrate every morphology with an *energetics*. Even if many aspects of his thoughts were never fully understood, this fascinating perspective deeply influenced René Thom's and Gilles Deleuze's work.

Deleuze (1991:247, 318 n. 25) was interested in Simondon's definition of individuation, which presupposes a prior metastable state that is characterised by the distance between heterogeneous orders, as two or more structural series. Deleuze interprets their internal resonances as the constitution of systems. In this way, Simondon's model of individuation provides us with clues regarding the constitution of the plane of immanence, the space in which meaning is generated. 'Resonance' is the way in which heterogeneous concepts can be integrated into a non-fragmented whole (Deleuze and Guattari 1994:35). According to the deleuzian hypothesis, meaning extends from an 'immersive' situation (the 'immanence plane') in which processes and intensities work and produce sense relations without 'a priori forms'. How can we describe the immanence plane? A model that describes the constitution of the plane of immanence could be an important instrument, also directly related to the possibility of describing the generation of meaning and its structural articulation. In fact, describing the immanence plane is a risky operation. 'When the subject or the object falling outside the plane of immanence is taken as a universal subject or as any object *to which* immanence is attributed, the transcendental is entirely denatured, for it then simply redoubles the empirical (as with Kant), and immanence is distorted, for it then finds itself enclosed in the transcendent'—Deleuze (2001:27).

The essays have been subdivided in three thematic nuclei: (1) *Rethinking Individuation and Morphogenesis*; (2) *Morphologies, Culture and Spaces* and (3) *Immanence in Semiotics*. We start from the relationship between Thom's morphogenetic models and Simondon's notion of individuation. In particular, simondonian notions are often utilised in Thom's later works. For this reason, the first part of the volume focuses on Simondon's philosophy, hoping to cast new light in the direction of resonant and vibrational morphogenetic processes.

According to Andrea Bardin, Simondon's model of individuation is an alternative both to deterministic and in-deterministic perspectives in the philosophy of science. In fact, Simondon refuted Cartesian dualism, which indicates that the institution of the sciences depends on an ontological difference between the human

being and nature. This implies free will on one side, and a sort of neo-mechanism on the other. Simondon also rejected the position that states that meaning is present in discourse and therefore in nature, such as in phenomenological philosophy. According to Simondon, individuation explains how being-as-a-subject and being-as-an-object come from the same primitive reality. The conditions for knowledge possibility and the causes of individuated being's existence are the same; this confirms the universality of knowledge.

The indetermination of the individuation process is the focus of Giovanni Carrozzini's article, who deeply analyses the constitution of perceptive forms in Simondon's epistemology.

According to Simondon, during the operation of perception, perceptive forms are invented particularly due to elements that cannot be reduced to a principle of order and simplicity. From this perspective, perceptive forms are not the simple product of the application of innate and determined schemes. They are, on the contrary, an inventive result that includes 'undetermined' elements. This chapter explains the reasons for Simondonian criticisms of associationism and Gestalt theory, and explains his original proposal to modify the concept of pregnant perceptive forms, by taking the singular-contextual elements of the perceptual experience into account.

Alessandro Sarti and David Piotrowski's chapter continues the discourse of the constitution of perceptual units, by proposing a model for the internal processes which takes place during the operation of individuation. They outline the common perspectives in the work of Simondon, Deleuze-Guattari and Bateson, framing the individuation principle inside a relational epistemology. This allows us to consider the pre-individual as a heterogeneous continuously changing relational field, which is functionally supported by harmonic processes that individuate its consistent forms. With this framework in mind, the authors intend to highlight the functional/operatorial level of the individuation process in terms of its dual articulation of: (a) the 'definition' of contextual-immanent relational graphs and (b) the estimation of their reduced spectral structure by means of non-linear harmonic analysis. This research indicates that the individuation process concerns not only forms, but also spaces (planes of consistencies) in general. In the end, the relationship between individuated spaces and the space of control from the Thomian morphodynamical tradition is outlined, observing that the individuated space provides the axes for the space of control. Suitable (arbitrary) potentials complete the construction of the space of control, allowing for semiotic oppositions and categorization. In this manner the space of control is not an a priori given, but is constantly formed through a morphogenetic process.

Claudia Mongini's chapter broadens the perspective of individuation from perception to perceptibility. The emergence of sensibility is the focus of this dense research. Sensibility can be understood as the perceptibility of objects, phenomena and processes, which have not yet emerged on the conscious level, and consequently do not possess a stable and recognisable form within the cognitive configuration. The aesthetic dimension unveils the composition of the immanent and contextual relational field that defines pre-individualility. Claudia Mongini utilizes

Simondon's theory that links the fields of technique and aesthetics through the concept of techno-aesthetics. In this manner, aesthetics express the way a tool adapts to its function. It is grasped in its operational condition towards action, and denotes the coming of a surprising event, instead of the predictable and repetitive state. Aesthetics becomes a bridge in a specific co-adaptation between conflicting experiences, acquiring both a functional and an operative character.

The Part II of the volume presents three research projects that demonstrate the great epistemological potential of the morphogenetic approach for different fields: anthropology; paleolinguistics; and cultural geography. In a thomian perspective, natural and cultural changes are never in conflict, and are always coupled without reducing one to the other. Individuation expresses their connection. In his article 'The cultural individuation of human language capacity and the morphogenesis of basic argument-schemata', Wolfgang Wildgen describes how basic human capacities such as language capacity, writing and cultural innovations can not be explained by neo-darwinian theories due to the short lapse of time in which they arise. Mophogenesis and individuation help explain the relationship between genotype and phenotype without rejecting Darwin's principles. For example, individuation can represent a bridge between biological and cultural innovation. Individuals with new features must survive in the environment of individuals who do not possess these changes in order to be replicated. Similarly, cultural innovation must be perceived as positive by other individuals in order to be imitated. Morphogenetic processes explain the unfolding of specific *prégnances*, i.e. in the case of language and symbolic development. This differentiation is reflected in the syntax; syntactic archetypes can be interpreted in terms of mental scenarios. These cognitive schemas explain a number of activities. For example, the catastrophe of capture can explain how a person controls a rabbit or a stone, opening interesting perspectives on the dynamics of cultural development in the neolithic period.

The article 'Through the Looking-Map: Mapping as a Milieu of Individuation' by Mario Neve shows how the simondonian notion of individuation is crucial in explaining the mapping processes. The author describes 'mapping' as a transduction: the content C is represented with a form F′ through a different form F (e.g. the euclidean geometry). The human animal is not opposed to the environment, because it is a part of it. Human individuation is never complete: the human animal is always in a metastable state. This feature, which distinguish the individuation of the living being from the individuation of technical objects, expresses the historical dynamic which allows the actualization of the world as a product of historical and social choices, as well as the crisis of a given actualization, which leads to a new virtualisation of the environment.

Maps are also a keyword in Ferraro's article 'On Growth and Form of Narrative Structures'. Ferraro discusses the narratological concept of narrativity as a linear transformation (e.g. from 'prisoner' to 'fugitive') by arguing that the transforming function takes place within a map of meaningful possibilities. We can consider 'narrativity' as the complex, unstable relationship between the route and the map, the process and the system. Therefore, a more complex conception of transformation is required, such as that which Lévi-Strauss borrowed from D'Arcy

Thompson's work. In light of the concept of transformations between system, the search for transformational groups implies a complex notion of culture; not only a collection of texts but a network of related textual fragments, which come with multiple identities, in reference to different systems.

The Part III of the volume reflects on the constitution of the immanence plan. In his chapter, Francesco Marsciani reconstructs the path that led the Danish linguist and semiotician L. Hjelmslev to reconstruct the science of language by only using concepts that are immanent to it; avoiding sociological, psychological or philosophical unnecessary premises. These concepts are organised by a metalanguage in a consistent plane, which represents the formal condition of possibility for meaning, independently from the substance that 'fits' the empty squares of this formal space. As a result of this operation, this space is constructed as transcendental. Nevertheless, there is no dichotomy between form and substance. Otherwise, form would have logical, transcendent laws, whose substance would only be realised without playing an active role. On the contrary, form is the result of the theoretical control of the transformation of the substance.

As Marsciani writes, the immanent criterion would ask the transcendental to not transcend phenomena, and the transcendental criterion would force immanence to take form and not submit to the substantive adventures of the phenomenon to which it belongs. Marsciani underlines how a relational epistemology, which takes the transcendental aspect of the immanent forms into account, does not need other foundations. It does not allow us to think about science and its objects as different things. We have already seen, with Bardin, how Simondon found a similar solution.

Building on Simondon's conceptions of individuation, metastability and indetermination, Galofaro's work presents meaning as a form *(Gestalt)* that can be individuated through a process of formation *(Bildung)* from a pre-individual, previously undetermined semantic universe. The author works with Thom's archetypal morphology in two directions. On one hand he uses quantum computation in order to represent indetermination. And on the other he imports the addressing function from Greimas' theory in order to represent the introduction and the circulation of semantic values into the semantic universe. This starts from a transcendent space that is part of the immanence plan, as both substance and modes are in immanence according to Spinoza. This model of *transduction* is a specific case. Quantum computation is currently seen as a discrete finite case of quantum field computation where the number of qubits is finite. This view coincides with Simondon's consideration of matter as a field. Nevertheless, this model indicates many possible implications as to the connections between the immanence plane and our experience of the *Lebenswelt.*

Federico Montanari, in his chapter, investigates the relationships between Deleuze's plane of immanence and Simondon's individuation. Montanari highlights the important role played by individuation in Deleuze's theory, as well as Spinoza's concept of expression and Hjelmslev's epistemology. As the author suggests, the political and philosophical consequences of these relationships constitute an innovative perspective for semiotic studies.

In conclusion, Simondon, Deleuze and Thom's latest research reformulate the morphogenetic perspective, introducing the conceptions of individuation, prégnance/salience and metastability. We attempt to clarify this framework, and redefine it in the light of a relational epistemology, as well as regarding contemporary concepts of functional plasticity.

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# Contents

# Part I
# Rethinking Individuation and Morphogenesis

# Chapter 1
# On Substances and Causes Again: Simondon's Philosophy of Individuation and the Critique of the Metaphysical Roots of Determinism

**Andrea Bardin**

**Abstract** In his main work, *L'individuation à la lumière des notions de forme et d'information*, Gilbert Simondon displayed a theory of the discontinuous processes of individuation (or 'ontogenesis') from which structures emerge. Linking the concepts of singularity and historicity through the paradigmatic assumption of quantum physics, Simondon attacked both determinism and indeterminism by way of an original critique—neither empiricist nor idealistic—of the concepts of substance and cause.

> Il faut arriver à dissoudre cet énorme bloc du déterminisme métaphysique qui pèse sur la pensée scientifique
>
> Gaston Bachelard, *Le nouvel esprit scientifique*

## 1.1 Introduction

In his main work, *L'individuation à la lumière des notions de forme et d'information*,[1] Gilbert Simondon displayed a theory of the discontinuous processes of individuation (or 'ontogenesis') from which structures emerge. In Simondon's book one can only find sparse and rare references to topology: 'topology' is there the name Simondon gives to a new, complex mechanistic approach for the understanding and the explanation of any kind of process (physical, biological and

[1] Simondon completed the book in 1957, as his main PhD thesis. At the time two theses were required for completion of a PhD in French academia. Simondon's second dissertation was *Du mode d'existence des objets techniques*. While *Du Mode* was immediately published in 1958, thus making Simondon known as a philosopher of technology, *Individuation* underwent a quite complicated editorial process (see note 17). In what follows I will refer to Simondon's main work as simply *Individuation* and quote it as ILFI, according to common scholarly citation.

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psycho-social). It is a term he evokes in order to make a point against the deterministic form of mechanism which has shaped modern mechanicism since its beginnings. Although Simondon, during the 1980s, attended René Thom's seminars, and the latter dedicated a short article to the former after his death (Thom 1994), the absence of any direct reference to Thom's writings in Simondon's books shows no particular evidence of an actual historical link between the two thinkers. And, nevertheless, René Thom's brief essay *Halte au hasard, silence au bruit* triggered an interesting dispute on determinism in the 1980s, *La querelle du déterminisme* (Amsterdamski et al.1990),[2] which can be a valid step to understanding what Simondon was concerned with when he elaborated his philosophy of individuation. A brief *detour* through this dispute will provide a standpoint from which to appreciate how Simondon's theory of individuation contributes to a criticism of metaphysical assumptions which, unexpectedly, inhabit the most anti-metaphysical stances in what Althusser (1974) called the 'spontaneous philosophy of scientists'. Linking the concepts of singularity and historicity through the paradigmatic assumption of quantum physics, Simondon formulates a peculiar conception of transductive processes, which allows him to attack both determinism and indeterminism by way of an original critique—neither empiricist nor idealistic—of the concepts of substance and cause. In fact, the approach through which Simondon challenges morphogenetic processes in *Individuation* is effective both at the epistemological and at the historico-philosophical level. Taking his stand on his master Canguilhem's assumptions, Simondon's philosophy of individuation contributes both to dismantle the undisputed premises of the *querelle* on determinism themselves and to reveal the very metaphysical nature of modern mechanistic ontology.

## 1.2 Fascination with *Clinamen*

René Thom's article *Halte au hasard, silence au bruit* (1990a) harshly attacked what he polemically named the 'French popular epistemology', in which he included Edgar Morin, Jacques Monod and the 'couple' Prigogine-Stengers, i.e. those who 'sophistically' defended the notion of chance, captured as they were by some 'fascination with *clinamen*'.[3] On the contrary, according to Thom, a metaphysical 'decision' for determinism is the only one possible for an ethics capable of driving the asymptotic progress of science:

> As a philosopher, the scientist can leave the question open, but as a scientist, it is a question of principle for him […] to adopt an optimistic perspective, postulating that nothing, in nature, is a priori unknowable. (Thom 1990a, p. 63)

[2] Besides Thom's essay and the subsequent debate published in the review *Le débat*, the book contains some further additions where the interlocutors revisited their arguments a few years later.

[3] According to Thom, chance is 'a void concept', a 'substitute of divine finality' (Thom 1990a, p. 75, 63).

From Thom's essay one understands that the metaphysical decision for ontological determinism is the proper founding value of an ethics of science, which opens and defines the horizon of scientific research, thus circumscribing all of its possible empirical limitations.

After 6 years Thom further clarified his view in another brief text entitled *Postface au debat sur le determinisme* (1990b). There he initially seemed to accept Amsterdamski's differentiation between 'global determinism' and 'local determinism' (Amsterdamski 1990), admitting that it is not possible to decide on a global determinism, since the object of scientific research is always limited and therefore the determinism one can derive from it is necessarily partial, local. These considerations brought him to progressively reformulate his initial claims and to eventually chose a kind of *epistemological determinism* in which a deterministic postulate still grounds the ethics of science without concerning the *ontological* status of reality in itself. In short, reality should be deterministically conceived in order to be fully knowable—at least in principle, although such a knowledge is never actually complete:

> Perhaps the metaphysical choice for global determinism is not particularly interesting for science […] In the never ending adventure of scientific research, one has of course to stop […] but such stops are due to the failures of our intelligence rather than to an 'essential' impossibility to go beyond. (Thom 1990b, pp. 277–278)

Thus Thom is assured against any possible charge of adhering to a sort of ingenuous pre-Kantian deterministic ontology. And nevertheless, his statements concerning a purely 'local' determinism—which I have defined as 'epistemological' in contrast to ontological and/or metaphysical characterisations—appear inconsistent when compared with two quite symptomatic passages in the text. The first refers to Einstein's old joke: 'I am among those who do not believe that God plays dice' (Thom 1990b, p. 275); the second is a note: 'the conflict determinism/chance is the manifestation of an ontological preference either for the substance or for the attribute' (Thom 1990b, p. 275, 279 note iv). In light of Einstein's joke, this second notation assumes the unexpected form of an ontological stance. In fact, when he associates determinism with substance *against* chance and attributes, Thom renews his attack on 'the deconstructors of being, the detractors of order and cantors of chaos', which actually 'prefer statistics to determinism' (Thom 1990b, p. 279).[4] Here Thom seems to reaffirm—at least implicitly, and consistently with his previous essay—an ethico-ontological choice for 'substance' and 'cause' as the basic tools of determinism against the 'popular epistemology' which would undo being into mere relations thus 'outrageously glorifying chance' (Thom 1990a, p. 61).

In this approach, substantialism and determinism are strictly entangled, within a kind of 'spontaneous philosophy of scientists' which returns to a remarkably

[4] In Thom's view the use of statistics is the mark of the impossibility to gain a complete deterministic description of a process (Thom 1990a, p. 66), and nevertheless it proves a valid hermeneutic function (Thom 1990b, p. 274).

ancient tradition.[5] According to my hypothesis, behind any substantialistic and deterministic epistemology one invariably finds a fundamental Cartesian-like metaphysical dualism. Since its Cartesian origin, this choice for determinism seems to maintain the burden of a metaphysical dualism which no phenomenological *epochē* can escape. Neither (neo)Kantian epistemology nor Empiriocriticism can be safely placed outside the perspective of a science imagining reality as a totalised complete system under the disincarnated look of the subject. This is quite evident in the implications of Laplace's 'radical' mechanism. As Thom himself recalled in his preface to the *Essai philosophique sur les probabilités*, although he denied any substantiality to the subject of scientific knowledge, Laplace could not avoid constructing—*such as* Descartes had done—a 'metaphysical-theological hypostasis' on which he could ground the postulate of exteriority of the subject's look in relation of its object-universe (Thom 1986, pp. 22–23).[6] It is worth noting that, in addressing this very criticism to Laplace, Thom in fact seems to collocate himself in a tradition according to which the 'arbitrary' institution of the subject of science depends on an 'ontological difference' between human being and nature: 'in order to assume epistemic significance, determinism necessarily requires human free will' (Thom 1990b, p. 272). An alleged ontological difference reveals itself here as grounded on a presupposed anthropological difference, a basic epistemological 'value' deeply-rooted in a supposed 'human nature', which would express (and celebrate) itself in the asymptotic, progressive tendency towards the research of truth:

> All these efforts in the search for truth tend to lead it [*l'esprit humain*] back continually to the vast intelligence which we have just mentioned, but from which it will always remain infinitely removed. This tendency, peculiar to the human race, is that which renders it superior to animals; and their progress in this respect distinguishes nations and ages and constitutes their true glory. (Laplace 1814, pp. 3–4)

Now, if it were true that Thom's morphodynamic structuralism would run the risk to develop—in Jean Petitot's words—'a neo-mechanism' (Petitot 1975, pp. 145–146), Simondon's criticism of determinism might be easily extended to it. And nevertheless my aim is not to reduce Thom's thought to the simplistic image of modernity I just evoked, but rather to explore the risky implications of the approach I named 'epistemological determinism'.[7] This allows me to sketch the ideal-type of modern mechanistic philosophies, as far as they refute any ontological value to the concept of chance, assuming it only as the limit-case indicating the shortage of

[5] I am borrowing the expression used by Althusser (1974). I assume here that the 'spontaneous philosophy of scientists' fails to grasp the differential relationship between science and ideology, in fact ideologically taking the scientific-mathematical representation of reality for reality itself. On Althusser's course, see Macherey (2009).

[6] Partially quoted in Prigogine-Stengers (1990), p. 248.

[7] Indeed, I am adopting the expression 'epistemological determinism' following Bachelard's suggestion of taking it in a sense deprived of any metaphysical presumptions (Bachelard 1951, p. 223), which differs from the meaning attributed to it by Bouquiaux when commenting the same *querelle du déterminisme* (Bouquiaux 1994, pp. 94–96).

complete knowledge of causes, which would be the essential postulate of scientific method. My enquiry concerns the possible discovery, beyond apparently different forms of determinism, of a similar theoretical structure which would prove an implicit adhesion to a dualistic metaphysics, i.e. an anthropocentric stance that de facto preserves for human beings a privileged place *in* or *out of* nature. In the present article I will try to show how Simondon's theory of individuation can allow us to move in a different direction, and develop a conjoint criticism of substantialism and determinism by endorsing another interpretation of the significance of the apparent 'distance' between human being and nature, and of the early-modern epistemological divide between knowledge and reality.

## 1.3 The Philosophy of Individuation and Its Paradigms

Simondon's philosophy of 'individuation', or of 'ontogenesis', is fully inscribed within the modern horizon of the philosophical system, as well as the cybernetic project which he assumes as a model when he is writing his doctoral thesis, *L'individuation*, during the 1950s. Simondon's aim is to provide relevant contribution to the epistemology of natural and social sciences, thanks to a theory of processes of information exchange at all levels, a model he transposes onto the different regimes of individuation: physical, biological and psychical-collective.[8] In fact, in all the different epistemological domains, an unquestioned and 'obscured zone' prevents the knowledge of ontogenesis. In particular, a substantialistic conception of the individual is what contributes to hide the processes of individuation, and it is therefore the main target of Simondon's attack to classical substantialism.

Thus *Individuation* starts with a double critique: on the one hand of the Aristotelian hylomorphic dualism of matter and form, on the other of the monistic reduction of nature to a fundamental substance (ILFI 23). Simondon's effort is, in both cases, to demonstrate the inadequacy of the conceptual apparatus of classic philosophy with regard to the results of twentieth century scientific thought, mainly quantum physics. For this reason, if it is true that the term 'individual' spans all the domains that *Individuation* ascribes to 'being', it is also true that Simondon distances himself from its classical link with the concepts of 'substance', 'essence', and 'form'. Furthermore, it is quite clear that only a redefinition of the concept of 'individual' could reveal what the philosophical imagination of a substantialised individual has always been hiding, i.e. the processes of individuation: 'to be rigorous, one should not speak of individual, but rather of individuation' (ILFI 191).

In two early programmatic texts, Simondon challenges directly the problem of the theoretical status of the philosophy of individuation, levering on the concepts of

[8] An extension likely to prompt the further observation of Canguilhem, his *directeur de thèse*, according to whom 'From the philosophical point of view, it would be a question of a new kind of Aristotelianism, on the condition, of course, that Aristotelian psychobiology and the modern technology of transmission not be confused' (Canguilhem 1943, pp. 277–278).

'structure' and 'operation (i.e. 'process').[9] While 'structures' are easily recognisable as the objects of existing sciences, in order to challenge the difficult goal of understanding 'operations' or 'processes', Simondon opts to refer to two 'basic intuitions' which should function as paradigms for the explication: crystallisation and modulation. The opposition between the two kinds of processes—which in fact poses a lot of hermeneutic problems—is nevertheless a good starting point to cross two fundamental and complementary themes traversing *Individuation*: (a) the theme of the double nature of the structured individual, considered both a system and *part* of a system, and (b) the theme of the mixed causality characterising processes.

### *1.3.1 The Structure (the Individual as a System)*

Modulation and crystallisation are for Simondon two different ways of understanding and describing the same processes at different levels, thus delineating a different representation of the individual depending on the level at which it is considered. In *crystallisation* the individual is understood as *a part* of a process which goes from the encounter between a simple individual (the crystal seed) and a milieu full of potentials (the supersaturated solution) producing a partially individuated system. Such an encounter functions as the trigger [*amorce*] of the system phase-shift [*déphasage*] into a complex individual (the crystal) and a milieu deprived of potentials (the low-concentration solution). On the contrary, in *modulation* the individual itself is understood as a metastable system made of different 'phases', the result of a coupling of initially independent systems and 'processes of formation' [*prise de forme*] which the hylomorphic scheme improperly divides into 'form' and 'matter', as in Simondon's example of the moulding of a brick (ILFI 40 ff.).[10]

It is precisely this double characterisation of the system that induces Simondon to introduce the concept of 'metastable system'. The classic 'stable' individual,

[9] Simondon uses there the term 'operation' as a synonym for 'process'. Although they first appeared undated in the second edition of *L'individu et sa genèse physico-biologique* (1995), the two programmatic texts *Analyse des critères de l'individualité* (in ILFI 553–558) and *Allagmatique* (in ILFI 559–566) clearly express Simondon's need for an overall view on the project of *Individuation* which he probably sketched before or during its elaboration (1957–1958). They could also be a further revision of its outcomes, in view of the 'general theory of social sciences' Simondon exposes in his paper at the *Société Philosophique* in 1960 (in ILFI 531–551). However, in this case the absence of the concept of 'transductive operation', still central in Simondon's paper, could hardly be explained.

[10] Simondon borrows the term 'phase' from physics and chemistry in order to indicate how different processes, parallel, divergent or convergent, are simultaneously taking place in a system. In short, the physical notion of phase serves him to undermine a substantialistic representation of the individual, conceiving it as a 'phase shifted' system simultaneously crossed by different and divergent processes. The individual itself is thus a system made of phases and thresholds which can put different systems in relation.

identical to itself, becomes in this sense the impossible limit-case of a perfectly static system, the fictive name for a completely accomplished process of individuation, while in actual fact one is always witnessing processes of individuation that deprive individuals of any fixed identity:

> The relation of being with itself is infinitely richer than identity. Identity, a poor relation, is the only relation of being to itself that one can conceive according to a doctrine which considers being as single phased. (ILFI 318)

The difficulty of Simondon's attempt to conceptually dismantle the traditional ontology of identity, is evidenced here by the ambiguity the term individual retains throughout the whole text of *Individuation*. This ambiguity carries on a double meaning: the one prevalent within the philosophical tradition, the individual to which Simondon refers as the structured 'part' of a system in the course of individuation, and the individual crossed by or, better, emerging from processes taking place at different levels, to which Simondon often implicitly refers as a system in the course of individuation. It is precisely through the concept of 'metastable system' that Simondon refers to a being which is 'more than a unity and more than an identity' (ILFI 26).

### *1.3.2 The Process (Individuation as Operation)*

Although a mechanical sequence, the beginning of the *process of crystallisation* is irreducible to the sequence itself. The process is triggered by the encounter of the system with the singularity of a crystal seed: an encounter which cannot be strictly reduced to the sequence it triggers, and therefore is not determinable within the system itself.[11] On the other hand, the *process of modulation* begins when different systems converge. Such a process could be considered determinable only at the level of the accomplished (macro) system, where in fact there would be no *emergence* of a new system, but merely the assemblage of two subsystems.[12]

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[11] Whether it is introduced from the outside or emerging from a causal encounter of molecules: 'A seed crystal can be replaced in certain cases by chance encounters, i.e. by a chance correlation between molecules' (ILFI 550).

[12] One must at all costs avoid any interpretation of the relations among different scale systems as a kind of Chinese box game culminating into a Nature-whole conceived as a System including all systems, since this is exactly what Simondon explicitly denies when challenging Kurt Goldstein's 'Parmenidean ontology' and asserting his own theory of systems as metastable, phase-shifted and 'in state of disparation', therefore incomplete and not entirely determinate (ILFI 229). According to Simondon 'Nature' conceived as a macro-individual would be the silent and perfectly stable—dead—universe of maximum entropy; on the contrary, we are exclusively concerned with 'non-totalised' systems: 'Systems cannot be *totalised*, since the fact of considering them the sum of their elements spoils the awareness of what actually makes them systems: relative separation of the sets it contains, analogical structure, disparation in general, relational activity of information' (ILFI 234, n. 1). Goldstein's book *The Organism* (in the German original: *Der Aufbau*—the Structure—*des Organismus* 1934) is a Gestalt-like approach to organism through a joint study of biology,

Simondon's original hypothesis was that each crystallisation is in fact a reversed modulation, and vice versa (ILFI 566). But what the two 'paradigms' of modulation and crystallisation really share as processes, is the fact that none of them can be entirely reduced to a deterministic sequence of cause-effect relations.

In *Individuation*—according to the inspiring methodological paradigm of quantum physics—all processes are characterised by a fundamental discontinuity and by reiterated changes of the order of magnitude. And on this topic it is worth recalling how Simondon's debt to the physicist Louis De Broglie, even if not always evident, is constant and decisive throughout *Individuation*.[13] Although referring to microphysics, the discovery of the 'indeterminacy principle'[14] poses philosophical problems concerning not only the deterministic characterisation of classical mechanics, but also the status of all sciences related to objects of a different magnitude in which, however invisible and non explicitly described, such factors still produce effects. De Broglie's argument entails the possible expansion of the approach derived from microphysical discoveries, first of all to biology,[15] and, furthermore, to social sciences: 'its [microphysics] relevance is not limited to the domain of physical sciences, it applies to the sciences studying life, human beings and human societies' (De Broglie 1947, p. 225).[16] In this perspective, at all levels, from microphysics to social systems, for each process there are both determined conditions of state (i.e. possible effects and impossible ones), and indeterminacy margins of becoming, which exclude any uniform, linear and continuous relation between causes and effects. In Simondon's view, a conception of the individual as a metastable system involves a complete overhaul of the methodology of the social sciences, and a task comparable to the one which the natural sciences seemed to be achieving through questioning the ontological status of their object:

> Could we do the same in the social sciences? Could we found a social science [*la Science humaine*] respecting, of course, multiple possibilities of application but having at least one common axiomatic applicable to different areas? (ILFI 355)

(Footnote 12 continued)
psychiatry and medicine, which had great relevance for an entire generation of French philosophers during and after the Second World War.

[13] The importance of De Broglie is is quite clear if one considers that, among the only 20 bibliographical references in *Individuation*, three are De Broglie's (*Archives de Georges Canguilhem*. Paris ENS, CAPHES: GC. 40.2.1).

[14] Even if the current English translation is 'uncertainty principle', the original term used by Heisenberg was *Unbestimmtheit*, which can also mean 'indeterminacy'. I will use the second term, since it better expresses an ontological lack of determinacy rather than an epistemological uncertainty of knowledge.

[15] 'A mammal, for instance, belongs to the microscopic world as far as the elements directing its living dynamics are collocated, in effect, at the level of atomic systems. The functioning of living systems will therefore be studied 1 day thanks to microphysical concepts' (De Broglie 1947, p. 162).

[16] On the philosophical relevance of early twentieth century microphysics, see in particular Chap. 7 on *Les révélations de la microphysique*, and Chap. 11 on *Hasard et contingence en physique quantique*.