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Andrea Bardin

Epistemology and Political Philosophy in Gilbert Simondon

Individuation, Technics, Social Systems

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Epistemology and Political Philosophy in Gilbert Simondon

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to Susanna

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Part I
Nature and Knowledge

Nulle part la confusion n'est aussi visible que dans les discussions sur l'individualité […] Concluons donc que l'individualité n'est jamais parfaite, qu'il est souvent difficile, parfois impossible de dire ce qui est individu et ce qui ne l'est pas, mais que la vie n'en manifeste pas moins une recherche de l'individualité et qu'elle tend à constituer des systèmes naturels isolés, naturellement clos.

(Bergson, *L'évolution créatrice*)

The individuality of the body is that of a flame rather than that of a stone, of a form rather than of a bit of substance.

(Wiener, *The Human Use of Human Beings*)

Gilbert Simondon has been known as a philosopher of technics since his *Du mode d'existence des objets techniques* [On the Mode of Existence of Technical Objects] (MEOT) was published in 1958. Recently, after the posthumous first complete edition of his main work *L'individuation à la lumière des notions de forme et d'information* [Individuation in the Light of the Notions of Form and Information] (*Individuation*), Simondon's thought has become considered by scholars concerned with the connection between epistemology, ontology and political philosophy.[1] Taking into account the entire corpus of Simondon's oeuvre – the whole of his published works plus some unedited documents – and making substantial use of its sources, this book aims at showing the articulated interconnection between his philosophy of science and technology and his political philosophy. The book consists of three sections concerning different aspects of his research: (1) ontology and epistemology of individuation; (2) biological and social systems; (3) anthropology, technics and politics.

The first section analyses Simondon's attempt to re-configure the theoretical apparatus of philosophy according to some concepts he derived – following in the footsteps of his master Merleau-Ponty – from scientific and epistemological thought,

[1] At the time two theses were scheduled for a PhD, which preceded the entrance into French academia. While MEOT, the second thesis, directed by Georges Canguilhem, was immediately published in 1958, thus making Simondon known as a philosopher of technology, *Individuation*, the principal dissertation, directed by Jean Hyppolite, underwent a quite complicated editorial process (for a brief summary of it, see the note in the appendix to this volume). Simondon's texts will be quoted according to the list of abbreviations.

especially physics of *quanta*, thermodynamics and cybernetics. The second section shows the impact of biological concepts on the theorisation of the genesis and functioning of social systems, and the peculiar role played by technics in social dynamics. Simondon's main philosophical references in this field are Henri Bergson's biological and social theories, George Canguilhem's philosophy of life sciences and technics, Norbert Wiener's cybernetics of society and Leroi-Gourhan's palaeoanthropology. The third section of the book concerns the broader relationship between French epistemology and the conceptual renewal it elicited in the social and political field. I highlight Simondon's debts to the French sociological tradition, beginning with Mauss and Durkheim, and the way he posed the political problem outside of any positivistic faith in the power of technological progress and, at the same time, against the political regression inspired by Heidegger's anti-technological stance.

Simondon's view on the complex nature of social processes derives from his adoption of the paradigm of quantum physics to the study of social systems. Although he does not always make it explicit, a conception of human nature as a 'work in progress' is implicit in his epistemology. Hence his philosophy allows for a critique of the modern imagination – both ideological and scientific – of the contraposition between individuals and society, and can be a useful tool for questioning the contemporary relation between technological and social innovation in complex societies.

Chapter 1
Elements for a Philosophy of Individuation

In the title *Individuation in the Light of the Notions of Form and Information*, the concepts of form and information clearly indicate a theoretical progression toward the concept of individuation: 'form' and 'information' are a direct reference to the epistemological frameworks of *Gestalttheorie* and cybernetics respectively, in relation to which Simondon builds his own thesis. This chapter introduces the terms which constitute Simondon's jargon, showing how they are derived from and related to various fields of scientific research, and explaining their function in Simondon's philosophy. Crucial to his discourse are the *philosophical* notions of 'individual' and 'individuation' which, extended to every domain of being, Simondon proposes as the ontological foundations for a philosophical approach to what he calls a 'process of individuation' or 'ontogenesis'.

1.1 The Individual as a System: Structure and Operation

The centrality of the concept of individuation works as a counterpoint of Simondon's critique to the traditional concepts of form, matter, substance and cause.[1] *Individuation* begins with a critique of the Aristotelian distinction between matter and form, and aims to show the inadequacy of the conceptual apparatus of classical philosophy with regard to the results of twentieth century scientific thought. For this reason, if it is true that the term 'individual' spans all the domains that could be ascribed to 'being', it is also true that Simondon distances himself from its classical association to the concepts of 'substance' or 'essence'. And nevertheless, what is firstly noted is the extension of its use to all the different 'regimes of individuation'

[1] Concerning this topic see Bardin (2015), where part of this chapter has been developed.

A. Bardin, *Epistemology and Political Philosophy in Gilbert Simondon*,
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which Simondon analyses: physical, biological, psychic and collective.[2] An extension likely to prompt the further observation of Canguilhem, his *directeur de thèse* for MEOT, 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 would not be confused. (Canguilhem 1943: 277–278)[3]

Since 'individual' is a heavily layered term in the philosophical tradition, it should therefore be carefully redefined. I shall start from two successive and apparently contradictory definitions provided by Simondon, in order to set the conditions for their compatibility. The first definition appears in *Analyse des critères de l'individualité* [Analysis of Individuality Criteria], where Simondon states that '*there can be no science but of the individual*, this will be the epistemological consequence of our enquiry' (AI 553); the second appears in *Individuation*, where Simondon claims that 'to be rigorous, one should not speak of individual, but rather of individuation' (I 191). It is quite clear that only a redefinition of the concept of 'individual' could make sense of the above statements and allow the construction of a philosophy of the processes of individuation, although it is worth underlining immediately that Simondon could not avoid an equivocal use of the term 'individual' throughout his main work.

To formalize the complex status of the individual, Simondon uses, especially in the two programmatic texts, the terms 'structure' and 'operation'.[4] As for *structure*, the individual can always be considered a 'phase-shift' [*déphasé*] system; Simondon borrows the term 'phase' from physics and chemistry to indicate how different processes, parallel, divergent or convergent, are simultaneously taking place in a system. As for *operation*, the individual is necessarily involved in 'transductive' processes; the concept of 'transduction' has origins both biological (contamination) and technological (amplification), and refers to a mode of propagation – a non-deterministic sequence, presenting gaps and discontinuities. The individual is therefore defined in relation to both a phase-shift spatiality and a transductive temporality and, in addition, by the capability of producing further transformations in itself and in its own milieu. In Simondon's jargon, the individual is more or less 'metastable':

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[2] If the entirety of Simondon scholars take for granted that from crystals to higher degrees of complexity one can speak of individuals, this is more problematic concerning the subatomic world. See for instance the discussion with Aspe and Bontems, thus concluded by Stengers quoting Simondon: 'It is unclear whether what we call a critical fissile mass is not an individual as such' (Stengers 2002: 318–19). Simondon is frankly ambiguous on this topic, but I assume consistent with his thought that there are no limits of order or magnitude for individuality: thus with the photon one can have, 'synthesised *in the same being*, and carried by the same carrier, both a structured and an amorphous measure, a pure potential' (I 102, italics added).

[3] In his quick reference Canguilhem links Ruyer (1954) and Simondon (IGPB), both involved in a similar project of re-elaboration and amplification of the cybernetic concept of information.

[4] These 'programmatic texts' (see the *Brief Note* in the appendix) will be seriously taken into account here, just as Garelli (2004) has done, and Barthélémy (2009) suggests. My final thesis concerning the respective dates of their production will result from the analysis carried on in this chapter.

the term 'metastability', derived from thermodynamics, defines a system not on the basis of its stable 'form', but in relation to the potential energy involved in its precarious but still lasting equilibrium.

I will return analytically to each of these points, since the terms Simondon derives from the natural sciences force a considerable effort on the reader in order to reconfigure his philosophical imagination. What I would like to stress at this point is how this 'double' status of the individual – as a structure and as a process – emphasises the crisis of the category of identity. In fact, the concept of a 'metastable system' forces us to reconsider the notion of individual in terms of individuation (i.e. a complex and discontinuous system of processes) and denies any possibility of referring to any identity of being in itself:

> The relation of being to 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. (I 318)

The alleged identity of being is nothing other than a purely fictive limit case, often philosophically translated with the term 'individual', while the real philosophical operation which Simondon tries to implement is precisely the disjunction of the concepts of individual and identity. Thus the individual can be considered the key term of *Individuation* only if it is radically reassessed in the light of the discoveries of the natural sciences and in particular, as I will explain, of quantum physics. In fact, the classical concept of the individual is absorbed by Simondon into a new concept of the individual developed in light of the notion of a 'metastable system'. The 'stable' individual becomes 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 simply witnessing processes which deprive individuals of any fixed identity, since being is 'more than a unity and more than an identity' (I 26). Due to this double meaning, the use of the term 'individual' retains its ambiguity throughout the whole text of *Individuation*, where it primarily refers to the structured part of a process, but is also frequently used to name a system which can be individuated further.

This conception of the individual shapes Simondon's horizon when he is still aiming at a reformulation of the social sciences, countering their epistemology, which remains grounded on the concept of the individual. In fact, despite the pretension in the social sciences to assume the study of structures *and* of processes, according to Simondon they cannot avoid conceiving such processes outside of their interaction with stable, fixed and structured individuals. They are in the end sciences concerned with individuals in relation to other individuals or to the processes going beyond them, and they cannot consider individuals in themselves as processes and as relational structures.

On the contrary, Simondon's 'theory of individuation' seeks to overcome the conceptual deadlock that, firstly, conceives of interactions as only occurring between individuals and, secondly, sees the strict reduction of individuals to the processes out of which they emerge. According to Simondon, two complementary reductionisms are enacted by psychology and sociology: psychology reduces the individual

to the ultimate constituent of social processes, while, *symmetrically*, sociology removes any status of reality from them by assuming that individuals are part of the social whole to which they belong, i.e. an 'individual' of higher scale by which they are entirely determined (I 295–96). The epistemological problem Simondon is facing here could be formulated in the following terms: What are the conditions for the possibility of a science of the individual conceived of as an identity neither entirely self-oriented nor strictly hetero-referential? Or: what conceptual apparatus can ground a science of the processes of individuation which constitute metastable systems?

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? (FIP 533)

Thus conceived, a science of the individual is in fact a science of individuation, of systemic relations and processes, which requires a method extended over each domain of individuation, in order to enable the analysis both of the structures and the processes composing a system, integrating synchronic and diachronic issues.

Taking up Simondon's words again, one can conclude that, since '*there can be no science but of the individual*' and that the individual is a structure of simultaneous processes, a science of the individual necessarily entails a philosophy of individuation of the systems which Simondon defines as 'metastable'.

1.2 Metastability, (Non)Identity and (Non)Causality

Although Simondon openly declares his debt towards Norbert Wiener,[5] the term 'metastability' also refers to physics and chemistry. In any case, it defines a condition of equilibrium in complex systems, the stability of which can be easily broken by the intake of a little bit of energy or information and, conversely, needs a continuative and regular energetic support to counter its tendency to entropy. What is important, according to Simondon, is that a 'metastable system' can be 'structurally' defined by an inhomogeneous distribution of potential energy, since it has no other 'substance' than the differential relations constituting it. The assumption that *'every true relation holds the rank of being'* (I 28–29) entails important consequences both on the epistemological and on the ontological level. Not only *is* any kind of

[5] 'With twentieth century industry, our society enters a new *evolutionary* phase or, according to Norbert Wiener's expression, "metastable"' (RPE). As I will explain in Chap. 2, Wiener, one of the fathers of cybernetics, is one of Simondon's main (polemical) references for the criticism of the concept of information.

knowledge, at any level – from perception to concept – essentially a system of relations,[6] but also the objects of knowledge undoubtedly are:

> The physical object is a beam [*faisceau*] of differential relations, and its perception as an individuated being depends on grasping the coherence of such a beam of relations. (I 239)

It is important to notice how 'to grasp' [*saisir*] does not merely refer here to the construction of an order, a mental image, a form – as it happens with *insight* in *Gestalttheorie* – while the physical object would independently have its own stable existence: here for Simondon 'to grasp' means rather to *produce* a relation (i.e. being), precisely beginning with the encounter of a subject-system and an object-system.

Within such a newly generated metastable system full of potentials, the act of perception is therefore part of a complex process of knowledge, as the 'mental image' and any other processes are, which is both logical and ontological.[7] Thus the 'logical' and 'ontological' structures of a system are but limit cases of the real differential structure (which one could call 'mixed', if the word would not presuppose the anteriority of the limit cases to the structure). What really exists is a system in which the process of knowledge, its subject and its object, acquire their partially stable structure. 'Real' is what resists any imaginary simplification and constitutes the basis of scientific knowledge, producing its object as well as its subject, in perfect coherence with the quantum scale model, in which the experimental observation is, in fact, a reconfiguration of a new complex system where both the subject-instrument and the object are included and eventually defined.[8]

As already noted, in the programmatic texts Simondon constantly turns to the concepts of 'structure' and 'operation' (the latter meaning 'process') in order to define such systems, i.e. being *as* relation. In *Allagmatique* [Allagmatics] the term structure delimits the field of 'a systematised set of particular forms of knowledge: astronomy, chemistry, biology' which Simondon calls the 'theory of structures' (A 559). According to Simondon the sciences of structures cannot consider structures as metastable systems, partial and provisional products of the 'operations' constituting them. Thus a 'theory of structures' is by definition unable to explain the operation 'that makes for the appearance of a structure or that modifies it' (A 559), and therefore to understand the becoming of a system. Nevertheless, any attempt to treat the problem of operations separately ends in particularly complicated results, since what Simondon calls 'operation' is – in evident consonance with a Bergsonian matrix – an actual process, inaccessible *as such* to objective knowledge.

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[6] Simondon claims for instance that sensation (I 258, 313) and concept (I 245) have a relational and differential nature. But, more remarkably, one can refer to the French translation of the term 'cybernetics' as a 'science of relations [*science des relations*]' proposed by J. Loeb in his preface to De Broglie (1951: 1).

[7] About the peculiar conception of the 'cycle of the image' displayed by Simondon's course IMIN, see Sect. 9.1.

[8] Simondon's thought on this topic is strongly indebted to Gaston Bachelard, as clearly underlined by Barthélémy (2009: 230–33).

In the subsection dedicated to the *Théorie de l'acte analogique* [Theory of the Analogical Act] Simondon presents two 'basic intuitions' which should function as paradigms for the explication of the operation: crystallisation and modulation. Simondon's hypothesis is that each crystallisation is in fact a reversed modulation and vice-versa (A 566). This symmetric 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*: the themes of non-deterministic causality and of non-substantial identity.

First of all, in both paradigms of the operation, the cause-effect relation cannot be reduced to a deterministic one. The process of crystallisation, the crystal growth, although displaying a mechanical sequence, begins with an aleatory encounter of the system with the singularity of a seed crystal[9]: an encounter which cannot be strictly reduced to the sequence it triggers, and therefore is not determinable within the system itself. On the other hand, the process of modulation consists of a coupling [*couplage*] of two different systems. 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.

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'[10] and asserting his own theory of systems as metastable, phase-shift and 'in state of disparation',[11] therefore incomplete and not entirely determinate. According to

[9] Thus Simondon states that 'in a very remarkable study by M.P. Auger, it is said that a seed crystal can be replaced in certain cases by chance encounters, i.e. by a chance correlation between molecules' (FIP 550). Today we would better distinguish between processes in which the first crystal is introduced from without, already present within the system, or emerging from a random assembling of molecules.

[10] In *Individuation* Simondon attacks what he calls Kurt Goldstein's 'Parmenidean ontology' (I 229). Goldstein's book *The Organism* (in the German original: *Der Aufbau* – the Structure – *des Organismus* 1934) is a Gestaltic approach to organism through a joint study of biology, psychiatry and medicine, which had great relevance for an entire generation of French philosophers during and after the Second World War.

[11] The expressions 'phase-shift' [*déphasé*] and 'in the state of disparation' [*en état de disparation*] have different although strictly correlated meanings: they both refer to states of system related to processes. 'Phase-shift' refers to the actual presence of different phases within the same system, and better explains the system as the outcome of a process of individuation through 'phase-shifting' [*déphasage*] and the subsequent inclusion of previous phases of development within the resulting system. The 'disparation' of a system rather underlines that a system is actually capable of further individuations because of its internal tensions due to the 'disparation' of potentials. In short, a certain dose of disparation is a necessary precondition for 'phase-shifting', while phase-shift might determine a disparation of potentials or might not. While the term 'disparation' and the correlated adjective 'disparate' are used for the purpose of translating the French correlatives, I prefer to maintain the expression 'phase-shift' for both 'déphasé' and 'déphasage', according to the choice of the editors in De Boever et al. (2012). For a more accurate definition of the concepts of 'disparation' and 'phase', see respectively Sects. 2.3 and 3.1.

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 they contain, analogical structure, disparation in general, and the relational activity of information. (I 234, n. 1)[12]

My hypothesis is that the paradigms of modulation and crystallisation work as 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.[13]

In *crystallisation* the individual is understood as *a part* of a process which goes from the encounter between a simple individual (the seed crystal) and a milieu full of potentials (the supersaturated solution) producing a partially individuated system. In Simondon's terms, such an encounter is the trigger [*amorce*] of the system phase-shift 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, the result of a coupling of initially independent systems and processes, as in Simondon's examples of the moulding of a brick or the changing frequencies of coupled oscillators.[14]

The failed attempt to keep the two sides together in a single conceptual framework, probably pushed Simondon – between the programmatic texts and *Individuation* – towards the unification of the paradigms of crystallisation and modulation, thanks to what he names the 'transductive operation', or 'transductive process' or, more simply, 'transduction' (a concept which, in fact, does not appear in those earlier texts). In *Individuation* Simondon definitively abandoned the assumption that modulation and crystallisation could describe two different kinds of processes, and rather used the two notions to describe different and concurrent aspects of the same processes at different levels. Those who claim that in *Individuation* the paradigm of crystallisation exhausts the significance of transduction by quoting the paragraph *L'individuation comme genèse des formes cristallines à partir d'un état amorphe* [Individuation as a Genesis of Crystalline Forms from an Amorphous State], would end up in quite a bit of difficulty when trying to justify the following statement: 'individuation is a modulation' (I 220). As a matter of fact, in *Individuation* the concept of individuation seems to catalyse all the aporias displayed in Simondon's thought about the changing relations between structure and operation and the possibility of a science of such transformations. This would explain why the term

[12] See also MEOT 61–65, where Simondon proposes the same conception of the relations among the 'sub-sets' of the technical object, conceived as 'the theatre of a number of relations of reciprocal causality'.

[13] As Simondon's himself will admit: 'indeed, the action of the structural germ on a structurable field, in a metastable state that contains potential energy, is a modulation' (FIP 548).

[14] On the peculiar example of oscillators, see Sect. 2.2.

'individual' aporetically oscillates in the text between indicating the individual as a metastable system *and* the individual as the stable structure which results from *and* triggers further ('at the same time the result and the agent' I 191) processes of different orders of magnitude.

Simondon's attempt to provide a unified paradigm for the understanding of individuation will endure at least until the *Colloque* of Royaumont (1962).[15] But, before moving on to discuss that text, I will first analyse the 'transductive' mode of propagation and configuration of stable structures, assuming that Simondon basically maintained a consistent perspective on the nature of the processes implied. According to this perspective, the fact that the cause-effect relation is non-reducible to any deterministic formula (i.e. to the mechanical conception of nature which dates back to early-modern imaginary), entails dramatic consequences for a philosophical critique of substantialism. I will therefore assume that – both in the programmatic texts and in *Individuation* – Simondon aimed for a strictly connected reformulation of the concepts of cause and of individual:

> At the end of this double study [concerning the concepts of modulation and crystallisation], the philosophical notion of *causality* will be enriched and the notion of individual defined. (A 566)

1.3 Transduction, Singularity, Field

In *Individuation* – according to the inspiring methodological paradigm of quantum physics (Barthélémy 2005: 46; 2008: 66) – the process of transduction is defined by a fundamental discontinuity and by reiterated changes of the order of magnitude. On this topic it is worth recalling how Simondon's debt to the physicist Louis De Broglie, although not always evident, is constant and decisive throughout this text.[16] Although referring to microphysics, the discovery of the 'indeterminacy principle'[17] poses philosophical problems concerning not only the theoretical status of classical deterministic physics, 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: 'its [microphysics] relevance is not limited to the domain

[15] I will further discuss the question by treating the concept of 'pre-individual' in Chap. 3.

[16] This is quite clear if one considers that, among the only 20 bibliographical references in *Individuation*, three are De Broglie's. According to F. Balibar, in order to criticise the classical conception of the individual, Simondon made explicit De Broglie's implicit philosophical stance concerning the wave-particle duality against Bohr's 'complementarity principle' (Balibar 1995).

[17] 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.

of physical sciences, it applies to the sciences studying life, human beings and human societies' (De Broglie 1947: 225).[18]

This indicates the direction of Simondon's quest for 'a foundation of individuation at its different levels' (I 35). As already explained, the concept of transduction aims to describe the processes of the destructuring/restructuring of a 'metastable system', which progressively amplify the singular origin of the process itself, i.e. the encounter between *that* singular structure and *that* field of potentials. Indeed, Simondon's use of the terms 'singular' or 'singularity' is a very restricted one, which exclusively refers to structured individuals when they are the 'germ' or the result of a process triggered from an aleatory encounter. But in a wider sense one could legitimately claim that, as far as such a 'singularity' can be the origin as much as the result of a *transductive* process, the process itself can be considered singular. In this sense I feel consistent with Simondon's philosophy in defining as 'singular' any transductive process.[19]

Thus the concept of transduction serves Simondon's reading of the problem of ontogenesis in terms of processes of individuation which cannot be reduced to any of the terms constituting the determinism/contingency antinomy. According to him, the process of individuation must be explained by referring to determinate structural conditions *and* to undetermined aleatory conditions, thus making the hypothesis of a 'theory of singularities' the possible basis of a unified 'transductive' theory:

> It is possible, in the last instance, to suppose that the theory of singularity can be ascribed neither to the framework of a deterministic physics nor to the framework of an indeterministic physics. The two would rather be considered the particular cases of a new representation of the real that one might call the theory of transductive time or theory of the phases of being. This completely innovative mode of thinking – which conceives determinism and indeterminism as mere limit-cases – can be applied to different domains of reality beyond the one of elementary particles. (I 144)

Each system can therefore be conceived as a 'centre of transductive activity', neither dominated by any superior necessity ('quantic operations seem to show that this operation works through steps and not continuously' 1 143), nor characterised by any substantial essence ('the substance is not the model of being anymore' I 32).

From this perspective, as a main model for a unified theory of 'being *as* relation', Simondon often refers to the notion of 'field', 'a gift from social sciences to the sciences of nature' (FIP 538).[20] The fact that, as *Gestalttheorie* claims, the psychic and

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[18] 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*.

[19] As already explained, the concept of transduction has both a technological and a biological meaning. In both cases it refers to a process of amplification of information that Simondon conceives as endowed with 'a certain degree of indeterminacy' (MEOT 143).

[20] Thus Simondon continues explaining that the notion of field '*establishes a reciprocity of ontological status and operatory modality between the whole and the element*'. In effect, within a field – whether electrical, electromagnetical, of gravity, or of any other kind – the element has a double status and a double function: (1) as it receives the influence of the field, it is submitted to the forces of the field; it is situated at a certain point of the gradient representing the field; (2) it

physical fields are isomorphic, would in fact explain how it is possible to discover in both of them the same forms of organisation, and how the notion of field can be programmatically extended to social sciences. Nevertheless, this conception risks reducing the system to a complex net of causes and effects which, in the end, fails to undermine determinism.[21]

But this is precisely where the concept of transduction shows its strength, authorising Simondon to think individuation as – one could say – a partially aleatory relation. In conclusion – against the modern, deterministic, conception of nature, through and beyond the holistic conception of 'field' elaborated by the *Gestalttheorie* – Simondon understands 'being as relation', through quantum physics, in terms of a beam of transductive processes, the calculability of which is never complete, and the randomness of which is never absolute:

> In conclusion, one can advance an hypothesis analogous to physical quanta and to the relativity of the levels of potential energy […] According to this hypothesis, it would be possible to *consider all true relations as being, and as developing within a new individuation* […] This is the conception of being on which this study is grounded: the unity of being is not the identity of a stable state in which no transformation is possible; being is defined by a *transductive unity*, i.e. it can phase-shift in relation to itself, exceed *its own centre*. (I 28–31)

Thus for any process there are both determined conditions of state (i.e. possible effects and impossible ones), and indeterminacy margins excluding any uniform, linear and continuous relation between causes and effects. If processes tend to have a direction due to their irreversibility, nevertheless the actual processes can never be deduced from the initial state of the system.[22] And this, for Simondon, functions at any scale for any possible kind of science. This perspective excludes an exhaustively predictive science. It, on the contrary, necessitates a 'twofold' science, concerned on the one hand with conditions of state and structural tendencies and, on the other, with the ontogenesis of the singular operations of individuation. Simondon

actively intervenes in the field, by modifying its forces and the gradient distributions; one cannot define the gradient of the field omitting to define what appears at that point (FIP 538). When underlining the importance of the 'gift', Simondon is implicitly recalling Kurt Lewin's 'topological' psychology, derived from the physical notion of *field*: 'a totality of coexisting facts which are conceived of as mutually interdependent is called a *field* (Einstein 1933). Psychology has to view the life space, including the person and his environment, as one field' (Lewin 1946: 792. See also Lewin 1935). On Simondon's debt to and criticism of Lewin, see in particular Sects. 5.1 and 6.2.

[21] In his course IPM, Simondon will characterize the 'deterministic age' as the one which postulates the order of Nature is 'uniform, necessary, universal and analytical', i.e. eternal, deterministic, general and reducible to elementary elements. According to him the 'deterministic age' started collapsing at the end of nineteenth century, first attacked by evolutionary biology, then by holistic assumptions based on Maxwell's theory of fields, later integrated by *Gestalttheorie*, Goldstein and Merleau-Ponty (IPM 288–90). However, for Simondon the validity of the 'postulate of isomorphism' is rather to be found in morphogenetical processes (i.e. individuation processes), since the holism of 'form' does not in itself escape a deterministic horizon (IPM 298).

[22] This would correspond to the classical Laplacean definition of determinism: 'We ought then to regard the present state of the universe as the effect of its anterior state and as the cause of the one which is to follow' (Laplace 1814: 4).

refers continuously to such a science in the programmatic texts and in *Individuation* with the peculiar name 'allagmatics' [*allagmatique*]'.[23]

1.4 Allagmatics, Topology and Chronology

Simondon starts from the Bergsonian assumption that objective sciences are sciences of structures, incapable as such of grasping transductive processes. And yet he asserts that a theory of operations he defines as allagmatic, from the Greek *allagè* (change) and *màthema* (knowledge) is possible. In *Allagmatique* Simondon directly challenges the issue, not without incurring the potential risk of inconsistency patently exemplified by contrasting the following quotations:

> *Allagmatics* is the theory of operations. It is, at the level of sciences, symmetrical to the theory of structures, the systematised set of determinate fields of knowledge: astronomy, physics, chemistry, biology. (A 559)

> *Allagmatic Theory* is the study of the individuated being. It organises and defines the relation between the theory of operations (applied cybernetics) and the theory of structures (deterministic and analytic science). (A 565)

On the one hand allagmatics is conceived as a theory of operations complementary to the sciences of structures; on the other it is conceived as the study of the individual through the connection between the 'analytical' sciences of structures and the 'analogical' sciences of operations. The patent contradiction could be easily attributed to the schematic and provisional nature of the methodological writings, but I think it is worth going deeper in order to make sense of it and discuss the two possible interpretations it arouses.

In *Individuation* – where the methodological issue of a 'theory of operations' regularly returns – Simondon attacks certain approaches proposing a topological formalisation of processes which would reduce the dimension(s) of time to spatial coordinates. Such approaches can be only partially identified with Kurt Lewin's dynamical topology and René Thom's differential topology.[24] However, Simondon directly attacks what he calls topology:

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[23] The term recurs in I 48–50; 61–62; 82; 111; 127; 228; 238; 328; NC 506; 523–24; A 558–59.

[24] On Lewin see above n. 20. René Thom's work on differential topology dates to the early 1950s, but Simondon only attended his seminar during the 1980s, possibly hoping to find in his theory of linguistic and biological systems the universalising power he previously had attributed to cybernetics. Thom criticised Simondon, claiming that – due to an inaccurate knowledge of topology – he had failed to develop an adequate analysis of the 'subject of transductive knowledge', and subsequently could not provide a satisfying theory of signification (Thom 1994: 105). On the contrary, Jean Petitot views Thom's morphodynamics and semiophysics among Simondon's most surprising scientific anticipations (Petitot 2004: 104–6). Unfortunately, in his essay Thom – who ironically declared he had read IGPB without understanding it – did not even mention the third part of *Individuation*, where instead Simondon, as I will show, provided a theory of signification which could be actually related to Thom's semiotics (e.g. Thom 1968). However, if it is true that Thom's

> What a topology lacks is the consideration of potentials. Precisely because they are not structures, potentials cannot be represented as graphical elements of the situation. (I 238)

Simondon consistently criticises this point of view in the paragraphs concluding the analysis of each 'domain' of *Individuation*: at the end of physical individuation, in *Topologie, chronologie et ordre de grandeur de l'individuation physique* [Topology, Chronology and Order of Magnitude of Physical Individuation], at the end of biological individuation, in *Topologie et ontogenèse* [Topology and Ontogenesis], and at the end of psychic and collective individuation, where he raises the issues of time and of emotion respectively.[25] He ends each 'movement' with a similar attempt to resume the type of relation which 'structures' and 'operations' entertain within the concerned domain – respectively dedicated to physical, biological or psychic-collective individuation – whether it is formulated as a 'relation between chronology and topology' or as a 'central operational zone'.

I will limit myself here to the paragraph *Topologie, chronologie et ordre de grandeur de l'individuation physique* (I 148–53), since it is – as the whole of physical individuation – paradigmatic, and because I shall refer to the other parts when treating the themes of biological and psychic-collective individuation. For Simondon, topology and chronology – such as structure and operation, discontinuous and continuous, matter and energy – are complementary features of all systems and at the same time complementary ways of understanding the individuation of systems. The physical individual is a 'chrono-topological set, the complex becoming of which is made of subsequent crises of individuation' (I 149),[26] and topology and chronology are directly related to the 'limit cases' of knowledge which determinism and indeterminism properly are: 'determinism and indeterminism are nothing but limit-cases, since there is a becoming of systems: this becoming is the one of their individuation' (I 148).

The problem is both ontological and epistemological, and the solution lies, according to Simondon, in a science of discontinuous processes, in which the coupled-notions related to the opposition between structure and operation inevitably reveal their heuristic limitations:

> From this point of view it seems possible to understand why the opposite representations of continuity and discontinuity, of matter and energy, of structure and operation, can only be used as complementary couples. This is because these notions define the opposed and extreme characteristics of the different realities in which individuation takes place. But the operation of individuation is the active centre of this relation. (I 150–151)

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topology is 'a structuralism including dynamics' which 'develops, in fact, into a neo-mechanism' (Petitot 1975: 146), then Simondon's criticism of determinism could be easily extended to it.

[25] It is worth noting that in Simondon's original thesis the 'macro-domains' of individuation are only two, since the psychic-collective one is part of the individuation *'au niveau des êtres vivants'*. But this does not foil my argument, because it is true that the descriptions of individuation at every domain *and* sub-domain follow the same pattern. For a detailed explanation of the different structures of the original thesis and its published version, see below n. 28.

[26] 'The individuated physical being is not completely simultaneous to itself; its topology and chronology are separated by a certain gap' (I 149).