

THE POSITION OF THE PROBLEM OF ONTOGENESIS

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The reality of being as an individual may be approached in two ways: either via a substantialist path whereby being is considered as consistent in its unity, given to itself, founded upon itself, not created, resistant to that which it is not; or via a hylomorphic path, whereby the individual is considered to be created by the coming together of form and matter. The self-centered monism of substantialism is opposed to the bipolarity of the hylomorphic schema. However, there is something that these two approaches to the reality of the individual have in common: both presuppose the existence of a principle of individuation that is anterior to the individuation itself, one that may be used to explain, produce, and conduct this individuation. Starting from the constituted and given individual, an attempt is made to step back to the conditions of its existence. This manner of posing the problem of individuation--starting from the observation of the existence of individuals--conceals a presupposition that must be examined, because it entails an important aspect for the proposed solutions and slips into the search for the principle of individuation. It is the individual, as a constituted individual, that is the interesting reality, the reality that must be explained. The principle of individuation will be sought as a principle capable of explaining the characteristics of the individual, without a necessary relation to other aspects of being that could be correlatives of the appearance of an individuated reality. *Such a research perspective gives an ontological privilege to the constituted individual.* It therefore runs the risk of not producing a true ontogenesis--that is, of not placing the individual into the system of reality in which the individuation occurs.

What is postulated in the search for the principle of individuation is that the individuation has a principle. Within this very notion of principle, there is a certain characteristic that prefigures the constituted individuality with the properties it will possess once it is constituted. The notion of a *principle of individuation* arises, in a way, from a genesis in the other direction, a *reversed* ontogenesis: in order to account for the genesis of the individual with its definitive characteristics, one must suppose the existence of a first term, the principle, which contains that which will explain why the individual is an individual, and which will account for its *ecceity*. However, it would remain to be shown that the ontogenesis could have a first term as its first condition: a term is already an individual, or, in any case, something individualizable and that can be a source of *ecceity* and can turn itself into multiple *ecceities*. Anything that can serve as the basis for a relation is already of the same mode of being as the individual, whether it be an atom, an external and indivisible particle, *prima materia* or form. An atom can enter into relation with other atoms via the *clinamen*. It constitutes thereby an individual, viable or not, through the infinite void and the becoming without end. Matter can receive a form, and within this form-matter relation lies the ontogenesis. If there were not a certain inherence of the *ecceity* to the atom, the matter or the form, there would be no possibility of finding a principle of individuation within these realities. *Looking for the principle*

*of individuation in a reality that precedes individuation itself means considering the individuation as merely ontogenesis.*² The principle of individuation is thus a source of *ecceity*. In fact, both atomist substantialism and the hylomorphic doctrine avoid directly describing ontogenesis itself; *atomism* describes the genesis of that which is composed, such as the living body, which has but a precarious and ephemeral unity, arising from a chance encounter and dissolving again into its elements once the cohesive force that binds it in its compound unity is overpowered by a greater force. The cohesive forces themselves, which can be considered as the principle of individuation of the compound individual, are placed into the structure of the elementary particles that exist for all of eternity and that are the true individuals. In atomism, the principle of individuation is the very existence of the infinity of atoms: it is always already there at the moment thought attempts to grasp its nature. The individuation is a fact: for each atom, individuation is its own given existence, and for each compound, individuation is the fact that it is what it is--a compound--by virtue of a chance encounter.

According to *the hylomorphic schema*, on the contrary, the individuated being is not already given at the moment one considers the matter and the form that will become the *sunolon*.³ We do not witness the ontogenesis because we always place ourselves before the taking-form that is the ontogenesis. The principle of individuation is not, therefore, grasped in individuation itself, as an operation, but in that which this operation needs in order to exist--that is, a matter and a form. One supposes that the principle is contained either in the matter or in the form, because the operation of individuation is not considered capable of *providing* the principle itself, but only of *putting it to work* [mettre en oeuvre]. The search for the principle of individuation occurs either before individuation or after individuation, depending on whether the model of the individual is physical (for substantialist atomism) or technological and vital (for the hylomorphic schema). However, there is *an obscure zone* in both cases that masks the operation of individuation. This operation is considered as something to be explained and not as that in which the explanation must be found--hence the notion of the principle of individuation. The operation is considered as something to be explained because thought tends towards the complete individual being that must be understood, going through the stage of individuation in order to come to the individual after this operation. There is, therefore, the presupposition of the existence of a temporal succession: first there is the principle of individuation, then this principle undertakes an operation of individuation, and finally the constituted individual appears. If, on the contrary, one supposes that individuation does not only produce the individual, one would not attempt to pass quickly through the stage of individuation in order arrive at the final reality that is the individual--one would attempt to grasp the ontogenesis in the entire progression of its reality, and *to know the individual through the individuation, rather than the individuation through the individual*.

We would like to show that the search for the principle of individuation must be reversed, by considering as primordial the operation of individuation from which the individual comes to exist and of which its characteristics reflect the development, the regime and finally the modalities. The individual would then be grasped as a relative reality, a certain phase of being that supposes a preindividual reality, and that, even after individuation, does not exist on its own, because individuation does not exhaust with one stroke the potentials of preindividual reality. Moreover, that which the individuation makes appear is not only the individual, but also the pair individual-environment.⁴ The individual is thus relative in two senses, both because it is not all of the being, and because it is the result of a state of the being in which it existed neither as individual, nor as principle of individuation.

Individuation is thus considered as the only ontogenesis, insofar as it is an operation of the complete being. Individuation must therefore be considered as a partial and relative resolution that occurs in a system that contains potentials and encloses a certain incompatibility in relation to itself--an incompatibility made of forces of tension as well as of the impossibility of an interaction between the extreme terms of the dimensions.

The term "*ontogenesis*" receives its full sense if, instead of giving it the restricted and derived meaning of the genesis of the individual (in opposition to a greater genesis: that of the species for example), one uses it to designate the character of becoming of being, that by which being becomes, insofar as it is, as being. The opposition between being and becoming can only be valid within a certain doctrine that supposes that the

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very model of being is a substance. However, it is also possible to suppose that becoming is a dimension of being corresponding to a capacity of being to fall out of phase with itself, that is, to resolve itself by dephasing itself. *Pre-individual being is being in which there is no phase*; the being in which individuation occurs is that in which a resolution appears through the division of being into phases. This division of being into phases is becoming. Becoming is not a framework in which being exists, it is a dimension of being, a mode of resolution of an initial incompatibility that is rich in potentials.⁵ *Individuation corresponds to the appearance of phases in being that are the phases of being*. It is not a consequence placed at the edge of becoming and isolated; it is this operation itself in the process of accomplishing itself. It can only be understood on the basis of the initial supersaturation of being--without becoming and homogeneous--that then structures itself and becomes, bringing forth individual and environment, according to becoming, which is a resolution of the initial tensions and a conservation of these tensions in the form of structure. In a certain sense, it could be said that the only guiding principle is *that of the conservation of being through becoming*; this conservation exists through the exchanges between structure and operation, proceeding by quantum leaps through successive equilibriums. In order to think individuation, being must be considered neither as a substance, nor matter, nor form, but as a system that is charged and supersaturated, above the level of unity, not consisting only of itself, and that cannot be adequately thought using the law of the excluded middle. Concrete being, or complete being--that is, preindividual being--is being that is more than a unity. Unity, which is characteristic of the individuated being, and identity, which permits the use of the law of the excluded middle, do not apply to preindividual being, which explains why the world cannot be re-constructed *post factum* with monads, even by adding other principles such as that of sufficient reason, so as to order them into a universe.⁶ Unity and identity only apply to one of the phases of being, posterior to the operation of individuation; these notions cannot help us discover the principle of individuation; they do not apply to ontogenesis understood in its fullest sense, that is to say, the becoming of being as a being that divides and dephases itself by individuating itself.

Individuation has not been able to be adequately thought and described because previously only one form of equilibrium was known--stable equilibrium. Metastable equilibrium was not known; being was implicitly supposed to be in a state of stable equilibrium. However, stable equilibrium excludes becoming, because it corresponds to the lowest possible level of potential energy;⁷ it is the equilibrium that is reached in a system when all of the possible transformations have been realized and no more force exists. All the potentials have been actualized, and the system having reached its lowest energy level can no longer transform itself. Antiquity knew only instability and stability, movement and rest; they had no clear and objective idea of metastability. In order to define metastability, the notions of order, potential energy in a system, and the notion of an increase in entropy must be used. In this way, it is possible to define this metastable state of being--which is very different from stable equilibrium and from rest--that Antiquity could not use to find the principle of individuation, because no clear paradigm of physics existed to help them understand how to use it.⁸ We will try therefore to first present *physical individuation as a case of the resolution of a metastable system*, starting from a *system state* like that of supercooling or supersaturation, which governs at the genesis of crystals. Crystallization provides us with well-studied notions that can be used as paradigms in other domains; but it does not exhaust the reality of physical individuation.

One can also suppose that reality, in itself, is primitively like the supersaturated solution and even more completely so in the preindividual regime, where it is *more than unity and more than identity*, capable of expressing itself as a wave or as a particle, as matter or energy, because every operation, and every relation within an operation, are an individuation that divides, or dephases, the preindividual being, while at the same time correlating extreme values and the orders of magnitude that were primitively without mediation. The complementarity⁹ would be the epistemological repercussion of the primitive and original metastability of reality. Neither *mechanism* nor *energetism*, which are theories of identity, can completely account for this reality. Field theory, particle theory, and the theory of the interaction between fields and particles, are all still partially dualist, but *they lead to a theory of the preindividual*. In a different manner, quantum theory grasps *this regime of the preindividual* that goes beyond unity: an exchange of energy occurs through elementary quantities, as if there were an individuation of energy in the relation between the particles, which can be considered in a sense to be physical individuals. This could perhaps

explain how the two new theories that have remained incompatible to this day--quantum mechanics and wave mechanics--could finally converge. They could be viewed as *two manners of expressing the preindividual*, through the different manifestations where it intervenes as preindividual. Below the continuous and the discontinuous, there is the quantum and the metastable complement (the more than unity), which is the true preindividual. The necessity of correcting and coupling the basic concepts in physics is perhaps due to the fact that *the concepts are adequate only to individuated reality*, and not to preindividual reality.

The paradigmatic value of the study of the genesis of crystals becomes apparent as a process of individuation: it would permit the macroscopic study of a phenomenon that is based on system states belonging to the micro-physical domain, which is molecular and not molar. It would grasp the activity that *is at the limit* of the crystal being formed. Such an individuation is not the meeting of pre-existing form and matter that exist as previously constituted, separate terms, but a resolution springing from a metastable system that is filled with potentials: *form, matter and energy pre-exist in the system*. Neither form nor matter suffices. The true principle of individuation is mediation, generally supposing an original duality of orders of magnitude and the initial absence of interactive communication between them, followed by communication between orders of magnitude and stabilization.

At the same time that a potential energy (the condition of a *higher* order of magnitude) actualizes itself, a matter organizes and divides itself (the condition of a *lower* order of magnitude) into individuals structured into an *average* order of magnitude, developing itself by a mediate process of amplification.

It is the energetic regime of the metastable system that leads to and supports crystallization, but the form of the crystals expresses certain molecular or atomic characteristics of the chemical and constitutive species.

In the domain of the living,¹⁰ the same idea of metastability may be used to characterize individuation; but in this case, individuation no longer occurs, as in the physical domain, only in an *instantaneous*, brusque and definitive manner that is like a quantum leap, leaving behind it a duality of environment and individual, with the environment being impoverished by the individual that it is not and with the individual no longer having the dimension of the environment. This type of individuation also exists for the living being as an absolute origin; but it is accompanied by a perpetuated individuation, which is life itself, according to the fundamental mode of becoming: *the living conserves within itself a permanent activity of individuation*. It is not only the result of individuation, like in the case of the crystal or the molecule, but it is the theater of individuation: not all of the activity of the living is concentrated at its limit, such as with the physical individual. Within the living itself, there is a more complete regime of *internal resonance*, one that requires permanent communication and that maintains a metastability that is a condition of life. This is not the sole characteristic of the living, and the living cannot be reduced to an automaton that maintains a certain number of equilibriums or that searches for compatibilities between different exigencies, according to a complex equilibrium formula composed of simpler equilibriums; the living is also the being that is the result of an initial individuation and that amplifies this individuation--an activity not undertaken by the technical object, to which cybernetics would otherwise compare the living, in terms of its function. There is, in the living, *an individuation by the individual* and not only a functioning that would be the result of an individuation completed once and for all, as if it had been manufactured; the living resolves problems, not only by adapting itself, that is to say by modifying its relation to the environment (which a machine can do),¹¹ but by modifying itself, by inventing new internal structures and by completely introducing itself into the axiomatic of vital problems.¹² *The living individual is a system of individuation, an individuating system and a system individuating itself*; internal resonance and the translation of the relation to itself into information are in this system of the living. In the physical domain, internal resonance characterizes the limit of the individual that is in the process of individuating itself; in the living domain, this resonance becomes the criterion for the individual in its entirety insofar as it is an individual; it exists in the system of the individual and not only in that which the individual forms with its environment. The internal structure of the organism is not only the result (as with a crystal) of the activity that occurs and of the modulation that occurs at the limit between the interiority domain and the exteriority domain. The physical individual, perpetually de-centered, perpetually peripheral to itself, active at the limit of its domain, does not have a veritable interiority; the living individual, on the contrary,

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does have a veritable interiority because individuation carries itself out within the individual; the interior is also constitutive in the living individual, whereas in the physical individual, only the limit is constitutive, and that which is topologically interior is genetically anterior. The living individual is contemporary to itself in all of its elements, which is not the case for the physical individual, which carries something of the past that is radically past, even when it is still growing. Within itself, the living is a nexus of informative communication; it is a system within a system, containing *within itself* a mediation between two orders of magnitude.¹³

Finally, it is possible to put forward the hypothesis, which is analogous to that of the quanta in physics and also to that of the relativity of potential energy levels, that individuation does not exhaust all of the preindividual reality, and that a regime of metastability is not only maintained by the individual, but carried by it, so that the constituted individual transports with itself a certain associated charge of preindividual reality, animated by all of the potentials that characterize it. An individuation is relative, just like a structural change in a physical system; a certain level of potential remains, and further individuations are still possible. This preindividual nature that remains linked to the individual is a source for future metastable states from which new individuations can emerge. According to this hypothesis, it would be possible to *consider every true relation as having the status of being, and as developing itself within a new individuation*. The relation does not spring up from between two terms that would already be individuals; it is an aspect of the *internal resonance of a system of individuation*, it is part of a system state. This living, which is both more and less than unity, carries an *inner problematic and can enter as an element into a problematic that is larger than its own being*. Participation, for the individual, is *the fact of being an element in a greater individuation*, via the intermediary of the charge of *preindividual reality that the individual contains*, that is, via the potentials that the individual contains.

In this way, it becomes possible to think of the relation that is interior and exterior to the individual as participation, without referring to new substances. The psychic and the collective are constituted by individuations that occur after the vital individuation.¹⁴ *The psychic is the continuation of the vital individuation in a being that, in order to resolve its own problematic, must itself intervene as an element of the problem by its action, as a subject*. The subject can be conceived of as the unity of being as an individuated living being, and as a being that represents its actions through the world to itself as an element and as a dimension of the world. The vital problems are not closed upon themselves; their open axiomatic can only be saturated by an undefined series of successive individuations that engage ever more of the preindividual reality and that incorporate it into the relation to the environment. Affectivity and perception integrate themselves in emotion and in science, both of which suppose the making use of new *dimensions*. However, the psychic being cannot resolve its own problematic within itself; its charge of preindividual reality--at the same time that it individuates itself as a psychic being that goes beyond the limits of the individuated living and incorporates the living into a system made up of world and subject--enables participation in the form of a condition of individuation of the collective. Individuation in the form of the collective turns the individual into a group individual, linked to the *group* by the preindividual reality that it carries inside itself and that, when united with the preindividual realities of other individuals, *individuates itself into a collective unity*. Both individuations, the psychic and the collective, are reciprocal to one another; they allow for the definition of a category of the transindividual, which can be used to explain the systematic unity of the interior (psychic) individuation and the exterior (collective) individuation. The psycho-social world of the transindividual is neither purely social nor the interindividual; it supposes a veritable operation of individuation from the basis of a preindividual reality, linked to the individuals and capable of constituting a new problematic with its own metastability. It expresses a quantum condition, correlative to a plurality of orders of magnitude. The living is presented as a *problematic being* that is at the same time superior and inferior to unity. To say that the living being is problematic is to consider becoming as a dimension of the living; the living is according to its becoming, which operates a mediation. The living is both agent and theater of individuation; its becoming is a permanent individuation, or rather, *a series of outbreaks of individuation* advancing from one metastability to another. The individual is thus neither substance nor a simple part of the collective: the collective intervenes as a resolution of the individual problematic, which means that the basis of the collective reality is already partially contained in the individual, in the form of the preindividual reality that remains linked to the individuated reality; that which we generally consider to be a *relation*, because of the mistaken hypothesis of the

substantialization of individual reality, is in fact a dimension of the individuation through which the individual becomes. The relation--to the world and to the collective--is a *dimension of individuation* in which the individual participates starting from the *preindividual reality* that individuates itself step by step.

Psychology and the theory of the collective are therefore linked: it is ontogenesis that shows what participation in the collective and what the psychic operation that is conceived of as the resolution of a problematic are. The individuation that is life is conceived of as the discovery, in a conflictual situation, of a new axiomatic that incorporates and unifies--into a system containing the individual--all of the elements of that situation. In order to understand psychic activity within a theory of individuation as the resolution of the conflictual character of a metastable state, we must find veritable ways in which metastable systems are instituted in life. In this sense, both the notion of the *adaptive relation of the individual to its environment*,¹⁵ and the critical notion of the relation of *the knowing subject to the known object* must be modified; knowledge is not constructed through abstraction starting from a sensation, but in a problematic manner starting from *an initial tropistic or taxonomic unity, a pairing of sensation and tropism, an orientation of the living being in a polarized world*. Here again we must detach ourselves from the hylomorphic schema; there is no sensation that would represent a matter that would be an *a posteriori* given for the *a priori* forms of sensibility. The *a priori* forms are an initial resolution--via the discovery of an axiomatic--of the tensions that result from the confrontation of the *primitive tropistic or taxonomic unities*; the *a priori* forms of the sensibility are neither the *a priori* nor the *a posteriori* that would be obtained by abstraction, but the structures of an axiomatic that appears in an operation of individuation. In the tropistic or taxonomic unity the world and the living are already present, but the world only figures in it as a direction, that is, as the polarity of a gradient that situates the individuated being in an *indefinite dyad* of which it occupies the median point, and that spreads out from this individuated being. Perception, then science, continue to resolve this problematic, not simply by the invention of spatio-temporal frameworks, but by the constitution of the notion of object, which becomes the *source* of the primitive gradients and which orders them according to a *world*. The distinction between *a priori* and *a posteriori*, an effect of the hylomorphic schema in the theory of knowledge, masks with its central obscure zone the veritable operation of individuation that is the center of knowledge.¹⁶ The very notion of a qualitative or intensive series should be thought according to the theory of the phases of being: it is *not relational*¹⁷ and is not maintained by a pre-existence of extreme terms, but it develops starting from a primitive average state that localizes the living and inserts it into the gradient that gives a direction [sens] to the tropistic or taxonomic unity. A series is an abstract vision of the direction [sens] according to which the tropistic or taxonomic unity orientates itself. One must begin with individuation, with being grasped at its center according to spatiality and becoming, not with an *individual* that is substantialized in front of a *world* that is foreign to it.¹⁸

This same method may be used to explore affectivity and emotivity, which constitute the resonance of being in relation to itself, and which link the individuated being to the preindividual reality that is linked to it, just like the tropistic or taxonomic unity and perception link it to its environment. The psychic is made of successive individuations that allow the being to resolve the problematic states that correspond to the permanent putting into communication of that which is larger and that which is smaller than it.

But the psychic cannot resolve itself at only the level of the individuated being alone; it is the foundation for the participation in a greater individuation, that of the collective; the individual being alone, putting itself into question, cannot go beyond the limits of anxiety, which is an operation that has no action, a permanent emotion that is not able to resolve the affectivity, a test by which the individuated being explores its dimensions of being without being able to go beyond them. *To the notion of the collective, taken as an axiomatic that resolves a psychic problematic, corresponds the notion of the transindividual.*

Such reforms¹⁹ of the notions described above are supported by the hypothesis according to which a given information is never relative to a unique and homogeneous reality, but to two different orders that are in a state of *disparation*;²⁰ information, whether it be at the level of the tropistic unity or at the level of the transindividual, is never available in a form that could be given; it is the tension between two disparate realities, it is *the signification that will emerge when an operation of individuation will discover the dimension according to which two disparate realities may become*

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a system. Information is therefore a primer for individuation; it is a *demand for individuation*, for the passage from a metastable system to a stable system; it is never a given thing. There is no unity and no identity of information, because information is not a *term*; it supposes the tension of a system of being in order to receive it adequately. Information can only be inherent to a problematic; it is *that by which the incompatibility of the non-resolved system becomes an organizing dimension in the resolution*; information supposes a *phase change of a system*, because it supposes an initial preindividual state that individuates itself according to the discovered organization. Information is the formula of individuation, a formula that cannot exist prior to this individuation. An information can be said to always be in the present, current, because it is the direction [sens] according to which a system individuates itself.²¹

This study is based on the following conception of being: being does not possess a unity of identity, which is that of the stable state in which no transformation is possible; being possesses a *transductive unity*, which is to say that it can dephase itself in relation to itself; it can overflow out of itself from one part to another, beginning from *its center*. That which we take to be *relation or duality of principles* is in fact the spreading out of being, which is more than unity and more than identity; becoming is a dimension of being, it is not that which happens to being according to a succession to which a primitively given and substantial being would be subjected. Individuation must be understood as the becoming of being, and not as a model of being that would exhaust its signification. The individuated being is not all of being, nor the first being; *instead of understanding individuation starting from the individuated being, the individuated being must be understood starting from individuation, and individuation from preindividual being*, according to several orders of magnitude.

The intention of this study is therefore to study the *forms, modes and degrees of individuation*, in order to situate the individual in being according to three levels: the physical, the vital and the psychic and psycho-social. Instead of supposing substances in order to account for individuation, we take the different regimes of individuation as the foundation of domains such as matter, life, spirit and society. Separation, hierarchization, and the relations between these domains appear as aspects of the individuation according to its different modalities; that is to say that notions of substance, form and matter are replaced by the more fundamental notions of initial information, internal resonance, metastability, energy potential, orders of magnitude.

However, in order to render this terminological and conceptual change possible, a new method and a new notion are needed. The method consists of not attempting to compose the essence of a reality using a *conceptual* relation between two pre-existing extreme terms, and of considering all veritable relations as having the rank of being. The relation is a modality of being; it is simultaneous to the terms for which it ensures the existence. A relation must be understood as relation in being, as a relation of being, a manner of being and not a simple relation between two terms that could be adequately known using concepts because they would have a separate and prior existence. It is because the terms are understood as substances that the relation is a relation of terms, and being is separated into terms because being is primitively--that is to say before any investigation of individuation--understood as substance. If, however, substance is no longer taken to be the model of being, it is possible to understand relation as the non-identity of being to itself--as the inclusion in being of a reality that is not only identical to it--so that being, as being, before all individuation, may be understood as more than unity and more than identity.²² Such a method supposes an ontological postulate: at the level of being prior to any individuation, the law of the excluded middle and the principle of identity do not apply; these principles are only applicable to the being that has already been individuated; they define an impoverished being, separated into environment and individual. They do not apply therefore to all of being--that is to say to the ensemble formed later by the individual and the environment--but only to that which, from the preindividual being, has become individual. In this sense, classical logic cannot be used to think the individuation, because it requires that the operation of individuation be thought using concepts and relationships between concepts that only apply to the results of the operation of individuation, considered in a partial manner.

From the use of this method, which considers the law of identity and the law of the excluded middle as too restrictive, a new notion emerges that possesses a multitude of aspects and domains of application: that of *transduction*. By transduction we mean an operation--physical, biological, mental, social--by which an activity propagates itself from one element to the next, within a given domain, and founds this propagation on a structuration of the domain that is realized from place to place: each area of the constituted structure serves as the principle and the model for the next area, as a primer for its constitution, to the extent that the modification expands progressively at the same time as the structuring operation. A crystal that, from a very small seed, grows and expands in all directions in its supersaturated mother liquid provides the most simple image of the transductive operation: each already constituted molecular layer serves as an organizing basis for the layer currently being formed. The result is an amplifying reticular structure. The transductive operation is an individuation in progress; it can, in the physical domain, occur in the simplest manner in the form of a progressive iteration; but in more complex domains such as the domains of vital metastability or of a psychic problematic, it can advance in constantly variable steps and it can expand in a domain of heterogeneity. Transduction occurs when there is an activity that begins at the center of being--both structurally and functionally--and that expands in various directions from this center, as if multiple dimensions of being appeared around this center. Transduction is the correlative appearance of dimensions and structures in a being of preindividual tension, that is to say in a being that is more than unity and more than identity, and that has not yet dephased itself into multiple dimensions. The extreme terms reached by the transductive operation do not exist prior to this operation; its dynamism comes from the primitive tension of the system of the heterogeneous being that dephases itself and develops dimensions according to which it structures itself; the dynamism does not come from a tension between the terms that will only be reached and placed at the extreme limits of the transduction.²³ Transduction can be a vital operation; it expresses, in particular, the direction [sens] of the organic individuation; it can be a psychic operation and an effective logical procedure, even though it is not limited to logical thought. In the domain of knowledge, it defines the veritable process of invention, which is neither inductive nor deductive, but transductive, which means that it corresponds to a discovery of the dimensions according to which a problematic can be defined. It is that which is valid in the analogical operation. This notion can be used to understand the different domains of individuation: it applies to all cases where an individuation occurs, expressing the genesis of a network of relations founded on being. The possibility of using an analogical transduction to understand a domain of reality indicates that this domain is indeed the location of a transductive structuration. Transduction corresponds to this existence of relations that are born when the preindividual being individuates itself; it expresses individuation and allows it to be thought; it is therefore a notion that is both metaphysical and logical. *It applies to ontogenesis, and is ontogenesis itself.* Objectively, it allows us to understand the systematic conditions of individuation, the internal resonance,²⁴ the psychic problematic. Logically, it can be used as the foundation of a new type of analogical paradigmaticism, allowing us to pass from physical individuation to organic individuation, from organic individuation to psychic individuation and from psychic individuation to the subjective and objective transindividual, all of which define the trajectory of this study.

One could, without a doubt, affirm that transduction cannot be presented as a model of logical procedure having the value of a proof. Indeed, we do not wish to say that transduction is a logical procedure in the current sense of the term; it is a mental process, and even more than a process, it is a functioning of the mind that discovers. This functioning consists of *following being in its genesis*, in carrying out the genesis of thought at the same time as the genesis of the object. In this quest, this functioning of the mind is called to perform a role that the dialectic could not, because the study of the operation of individuation does not appear to correspond to the appearance of the negative as a second stage, but to an immanence of the negative in the first condition in the ambivalent form of tension *and* incompatibility. What is the most positive in the state of preindividual being--the existence of potentials--is also the cause of the incompatibility and the non-stability of this state. The negative comes first as the ontogenetic incompatibility, but it is the other side of the richness in potentials; it is therefore not a substantial negative. It is never a stage or a phase, and individuation is not a synthesis, a return to unity, but a dephasing of being starting from its preindividual center of potentialized incompatibility. Time itself, in this ontogenetic perspective, is considered to be the expression of the *dimensionality of being individuating itself*.

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Transduction is not, therefore, simply a functioning of the mind, it is also intuition, because transduction is that by which a structure appears in the domain of a problematic, that is, as that which provides the resolution of the posed problems. However, transduction, as opposed to *deduction*, does not search elsewhere for a principle to resolve the problem of a domain: it extracts the resolving structure from the tensions of the domain themselves, just as a supersaturated solution crystallizes using its own potentials and according to the chemical species it contains, not using some foreign form added from the outside. Nor is transduction comparable to *induction*, because although induction retains the characteristics of the terms of reality that are contained within the studied domain, extracting the structures of the analysis of these terms themselves, induction only retains that which is positive--*that which is common* to all of the terms--eliminating that which is singular to them. Transduction is, on the contrary, a discovery of dimensions of which the system puts into communication the each of its terms, and in such a way that the complete reality of each of the terms of the domain can come to order itself without loss, without reduction, in the newly discovered structures. The resolving transduction *undertakes the inversion of the negative into the positive*: that by which the terms are not identical to each other, that by which they are *disparate* (in the sense this word takes in the theory of depth perception) is integrated into the system of resolution and becomes the condition of signification. There is no impoverishment of the information contained in these terms; transduction is characterized by the fact that the result of this operation is a concrete network that contains all the initial terms; the resulting system is made of this concrete network and contains all of it. The transductive order retains all that is concrete and is characterized by the *conservation of information*, whereas induction requires a loss of information. Transduction, like the dialectic process, retains and integrates opposing aspects; unlike the dialectic, transduction does not presuppose the existence of a prior time as the framework in which the genesis occurs, time itself being a solution, a dimension of the discovered systematic: *time comes out of the preindividual just like the other dimensions according to which individuation occurs.*²⁵

In order to think the transductive operation, which is the foundation of individuation in its different levels, the notion of form is insufficient. The notion of hylomorphic form makes up part of the same system of thought as that of substance, or that of relation as being posterior to the existence of the terms: these notions have been elaborated using the results of individuation; they can only grasp an impoverished reality, without potentials, and as a consequence, incapable of individuating itself.

The notion of form must be replaced by that of information, which presupposes the existence of a system in a state of metastable equilibrium that can individuate itself; information, unlike form, is never a unique term, but the signification that springs from a disparation. The ancient notion of form, such as provided by the hylomorphic schema, is too independent of any notion of system and metastability. That which Gestalt theory provided contains, on the contrary, the notion of system and is defined as the state towards which the system tends when it finds its equilibrium: it is the resolution of a tension. Unfortunately, an all too summary physical paradigmaticism caused Gestalt theory to only consider the state of stable equilibrium as a system state of equilibrium capable of resolving tensions: Gestalt theory was unaware of metastability. We would like to take up Gestalt theory and, through the introduction of a quantum condition, show that the problems posed by Gestalt theory cannot be directly resolved using the notion of stable equilibrium, but only by making use of the notion of metastable equilibrium. The Good Form is no longer the simple form, the pregnant geometric form, but *the signifying form*, that is, that which establishes a transductive order within a system of reality that contains potentials. This good form is that which maintains the energy level of the system, that which conserves its potentials by rendering them compatible: good form is structure of compatibility and viability, it is the dimensionality that is invented and according to which there is compatibility without degradation. ²⁶The notion of *Form* therefore deserves to be replaced with that of *information*. In doing so, the notion of information must never be reduced to signals or to the supports or carriers of information in a message, *as the technological theory of information tends to do, a theory that was initially abstracted from transmission technologies*. The pure notion of form must therefore be saved two times from an all too summary technical paradigmaticism: first, in relation to classical culture, the notion of form must be saved from the reductive manner the notion was used in the *hylomorphic schema*; and a second time, in order to save information as signification from the *technological theory* of information in modern culture, with its experience of transmission through a channel. For indeed the same aim is found in the successive theories of

hylomorphism, Good Form, and information theory: the discovery of the inherence of significations to *being*; we will attempt to find this inherence in the operation of individuation.

In this way, a study of individuation can lead to the reform of fundamental philosophic notions, because it is possible to consider individuation as that which must be known first about being. Before even considering whether it is legitimate to make judgments about beings, it is apparent that being can be spoken of in two manners: in a first, fundamental sense, being is insofar as it is; but in a second sense, always superimposed upon the first in logic theory, being is being insofar as it is individuated. If it were true that logic provided statements about being only after individuation, it would be necessary to institute a theory of being that is anterior to any form of logic; this theory could serve as the foundation to logic, because nothing proves in advance that there is only one possible way of individuating being. If multiple types of individuation were to exist, multiple logics would also have to exist, each corresponding to a specific type of individuation. The classification of the ontogeneses would allow us to *pluralize logic* using a valid foundation of plurality. As for the axiomatization of the knowledge of preindividual being, it cannot be contained within a pre-existing logic, because no norm, no system that is detached from its contents can be defined: only the individuation of thought can, by realizing itself, accompany the individuation of beings that are different from thought itself. Therefore it is neither immediate nor mediate knowledge that we can have of individuation, but a knowledge that is an operation that runs parallel to the known operation. We cannot, in the common understanding of the term, *know individuation*, we can only individuate, individuate ourselves, and individuate within ourselves. This understanding is--at the margins of what is properly considered as knowledge--an analogy between two operations, a certain mode of communication. The individuation of the reality that is exterior to the subject is grasped by the subject using the analogical individuation of knowledge within the subject; but it is *through the individuation of knowledge*, and not through knowledge alone, that the individuation of non-subject beings is grasped. Beings may be known by the subject's knowledge, but the individuation of beings can only be grasped by the individuation of the subject's knowledge ■

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NOTES

1. [This text is an advance publication from the forthcoming English translation of Gilbert Simondon's *L'individuation psychique et collective*. The text constitutes the first part of Simondon's introduction to the book, and will be accompanied in the English translation by a number of footnotes by Jean-Hugues Barthélémy (also reproduced here). The complete English translation of the book (by Arne De Boever, Gregory Flanders, Alicia Harrison, with Rositza Alexandrova and Julia Ng) will be published by the U of Minnesota P. The translator would like to thank the U of Minnesota P as well as Flammarion for giving *Parrhesia* permission to publish this text.—Trans.]
2. [This formulation only makes sense if the notion of “ontogenesis” is understood to designate the genesis of the individual or of the “being insofar as it is individuated,” as Simondon states further on. Simondon will later provide a second meaning to ontogenesis: it will designate the *becoming of being in general* or the “being insofar as it is,” which is to say the *pre-individual* being that will later come to replace, for Simondon, any “principle of individuation” that has already been individualized. This is why it can be said that if he is criticizing here the reduction of individuation to ontogenesis in the first meaning of the term, it is precisely in order to suggest that this genesis of the individual is only truly a genesis within ontogenesis in the second, broader meaning of the term. Simondon will soon show that this becoming of the being in general produces both the individual and its environment. It also must be pointed out that the notion of ontogenesis possesses a third meaning, one which designates the ontological theory itself understood from now on as a genetic ontology. The underlying reason behind this third meaning is that the thought of individuation must itself be an individuation; here we find the specificity of Simondon's thought in regards to the going beyond of the opposition between the subject and its object. Ontogenesis as a theory therefore is no longer an onto-logy in the strict sense of the term, that is to say as a logos that is exterior to what it knows or an ob-jectifying logos. --J.H. Barthélémy].
3. Aristotle, *Metaphysics* 1037^a 32.
4. It is not necessary that the environment be simple, homogeneous and uniform, but it may be; it can be originally crossed by a tension between two extreme orders of magnitude that the individual mediates when it comes to be.
5. And constitution, between extreme terms, of a mediate order of magnitude; ontogenetic becoming may itself be considered, in a certain sense, as mediation.
6. [Simondon is alluding here to Leibniz, who is the quintessential *substantialist* thinker.--J.H. Barthélémy].
7. [The notion of potential energy had been explored by Simondon in one of the properly *epistemological* chapters of *L'individu et sa g n se physico-biologique* [The Individual and Its Physical-Biological Genesis]. The two following pages, which are dedicated to *physical* individuation, are actually announcing the first part of *L'individu et sa g n se physico-biologique*, of which *Psychic and Collective Individuation* is the continuation, with both works being originally printed in one volume and with both having, for this reason, the same introduction. The original text represents Simondon's main thesis, defended in 1957 and entitled *L'individuation   la lumi re des notions de forme et d'information* [Individuation in the Light of the Notions of Form and Information]. The text *L'individu et sa g n se physico-biologique* appeared in France in 1964, and greatly influenced the early thought of Gilles Deleuze, whereas *Psychic and Collective Individuation*, which inspired Bernard Stiegler, was not published until 1989, the year of Simondon's death. --J.H. Barth lemy].
8. Intuitive and normative equivalents existed in Antiquity for the notion of metastability; however, because metastability generally supposes both the presence of two orders of magnitude and the absence of interactive communication between these orders, it owes much to the development of the sciences.
9. [The notion of “complementarity” was invented by the great physicist Niels Bohr to designate the fact that quantum reality sometimes manifests itself as a wave, sometimes as a particle; for Bohr, these two aspects are “complementary.” In Chapter 3 of the First Part of *L'individu et sa g n se physico-biologique* [The Individual and Its Physical-Biological Genesis], Simondon reinterprets this complementarity: he criticized Bohr for thinking of it as a “duality”--that is, an impossibility of being both at the same time--instead of as a “couple.” For Simondon, when the quantum reality manifests itself in the form of a particle, the wave characteristic is also present, but it is in the measurement apparatus, which is part of the phenomenon by virtue of the famous “quantum of action”--J.H. Barth lemy].
10. [The two following pages, dealing with *vital* individuation, are intended to announce, within the introduction common to both *L'individu et sa g n se physico-biologique* [The Individual and Its Physical-Biological Genesis] and to *Psychic and Collective Individuation*, the Second Part of *L'individu et sa g n se physico-biologique*.--J.H. Barth lemy].

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11. Ashby's homeostasis and homeostat.
12. It is by this introduction that the living has an informational effect, becoming itself a nexus of interactive communication between an order of reality that is superior to its dimension and an order of reality inferior to its dimension, which it organizes.
13. This interior mediation can intervene as an intermediary relative to the external mediation that the living individual realizes, which allows the living to bring into communication a cosmic order of magnitude (for example, solar light energy) and an infra-molecular order of magnitude.
14. [The next three pages, which deal with *psychic and collective* individuation, announce, within the introduction that is common to both *L'individu et sa g n se physico-biologique* [The Individual and Its Physical-Biological Genesis] and to *Psychic and Collective Individuation*, this final volume.--J.H. Barth l my].
15. In particular, the relation to the environment is impossible to imagine, before and during individuation, as a relation to a unique and homogeneous environment. The environment is itself a *system*, a synthetic grouping of two or more levels of reality, without intercommunication before individuation.
16. [This sentence summarizes a decisive critique that is addressed to Kant, and that will be developed in multiple sections of *Psychic and Collective Individuation*. Deleuze read this same introduction in *L'individu et sa g n se physico-biologique* [The Individual and Its Physical-Biological Genesis], and his critical relationship to Kant was influenced by it.--J.H. Barth l my].
17. [This passage is deceptive: Simondon uses the word "relational"--only to reject it--for that which is in fact a *link* between two *pre-existing* terms. However, a true *relation* is that which *constitutes* the terms that it connects, because it is an *individuation*. Thus, in *L'individu et sa g n se physico-biologique* [The Individual and Its Physical-Biological Genesis], Simondon rejects the "link" *in order to affirm the "relation,"* as will soon become clear in this introduction.--J.H. Barth l my].
18. By this we mean that the a priori and the a posteriori are not found in knowledge; they are neither form nor matter of knowledge, because they are not knowledge, but extreme terms of a preindividual--and, consequently, a pre-noetic--dyad. The illusion of a priori forms stems from the pre-existence, in the preindividual system, of *conditions of totality*, of which the dimension is superior to that of the individual in the process of ontogenesis. Inversely, the illusion of a posteriori stems from the existence of a reality of which the order of magnitude, in terms of spacio-temporal modifications, is inferior to that of the individual. A concept is neither a priori nor a posteriori but *a praesenti*, because it is an informative and interactive communication between that which is larger than the individual and that which is smaller than the individual.
19. [After having announced the three "regimes of individuation"--physical, vital and psycho-social--only the last of which being the object of the present study--Simondon turns to *general* and *methodological* considerations that are valid for the entirety of his genetic ontology, that is, for both the physical and vital individuations discussed in *L'individu et sa g n se physico-biologique* [The Individual and Its Physical-Biological Genesis] and for the psycho-social or "transindividual" individuation from *Psychic and Collective Individuation*. These general and methodological considerations are of capital importance, because they allow the reader to understand that the entire Simondonian ontology is a "philosophy of information," without, however, information being understood in the terms used by the Information Theory that founded Cybernetics, with which Simondon often enters into dialog. Here it is the notion of "transduction" that will supply the new *schema*, in order to *replace the classical hylomorphic schema while conserving the goal of a universal understanding of information considered as genesis and as the taking-form.*--J.H. Barth l my].
20. [On the notion of disparation, see the note in part 2, chapter 2, section 3.--J.H. Barth l my].
21. This affirmation does not lead us to contest the validity of the quantitative theories of information and the measurements of complexity, but it supposes a fundamental state--that of the preindividual being--prior to any duality of the sender and of the receiver, and therefore to any transmitted message. It is not the source of information that remains of this fundamental state in the classic case of information transmitted as a message, but the primordial condition without which there is no effect of information, and therefore no information: the metastability of the receiver, whether it be technical being or a living individual. We can call this information "primary information." [This note by Simondon is of a fundamental importance, because it helps dispel the misunderstanding that persisted for a long time in France in regards to the Simondonian conception of information--a misunderstanding that plagued not only *Du mode d'existence des objets techniques* [On the Mode of Existence of Technical Objects], but also *L'individu et sa g n se physico-biologique* [The Individual and Its Physical-Biological Genesis] when they appeared in 1958 and 1964. Simondon foresaw what he would call a "notional reform," *which begins with the notion of information*, insofar as information would be understood as "the formula of individuation": information is *first genesis*, and what

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information theory calls “information” is a transmission of a message that is *derived* from this initial genesis *of which it is the continuation*. That is why the living being can only receive an information through the metastability that it maintains, and that during the “absolute genesis” or the “first information” was *prior to any sender/receiver duality*. Simondon, therefore, replaces the *technological paradigm* of information, which is too reductive in his eyes, with a *physical, but pre-individual, paradigm*, that is to say, *both truly genetic and anti-reductionist*.--J.H. Barthélémy].

22. In particular, the plurality of the orders of magnitude, the primordial absence of interactive communication between these orders, is part of such an understanding of being.

23. It expresses, to the contrary, the primordial heterogeneity of two levels of reality, one larger than the individual--the metastable system of totality--and the other smaller than the individual, such as matter. Between these two primordial orders of magnitude, the individual develops itself by a process of amplifying communication of which transduction is the most primitive mode, already existing in the physical individuation.

24. Internal resonance is the most primitive mode of communication between realities of different orders; it contains a double process of amplification and condensation.

25. This operation is parallel to that of vital individuation: a vegetable institutes a mediation between a cosmic order and an infra-molecular order, sorting and distributing the chemical species contained in the ground and in the atmosphere by means of the luminous energy received from photosynthesis. It is an inter-elementary nexus, and it develops as the internal resonance of this preindividual system made of two layers of reality that are primitively without communication. The inter-elementary nexus fulfills an intra-elementary task.

26. Form appears as the active communication, as the internal resonance that brings about the individuation: it appears with the individual.