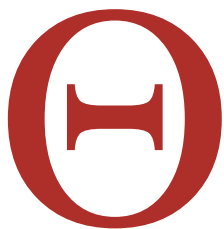


8, 2020

ISSN 2284-2918



*Thaumàzein*

Θαυμάζειν

RIVISTA DI FILOSOFIA

**MORPHOLOGY, PLASTICITY, AND  
TRANSFORMATION BETWEEN  
PHILOSOPHY AND BIOLOGY**



## ***Thaumàzein* – Rivista di Filosofia**

ISSN: 2284-2918

Thaumàzein is an open-access journal of philosophy and uses **double-blind peer review** in order to ensure and to improve the quality of philosophical discussion. Thaumàzein promotes special issues on topics of particular relevance in the philosophical debates. Founded in 2012, it is an international journal of annual publication.

DOI® NUMBER

Each paper published in *Thaumàzein* is assigned a DOI® number.

Cover image: Photo by William Warby on Unsplash

## COMITATO SCIENTIFICO

DAMIR BARBARIĆ – SVEUČILIŠTE U ZAGREBU (UNIVERSITY OF ZAGREB)  
MIRKO DI BERNARDO – UNIVERSITÀ “TOR VERGATA”, ROMA  
MARCELO BOERI – PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE, SANTIAGO  
JOHN CUTTING – INSTITUTE OF PSYCHIATRY, LONDON  
ANTONIO DA RE – UNIVERSITÀ DI PADOVA  
ROBERTA DE MONTICELLI – UNIVERSITÀ S. RAFFAELE, MILANO  
ANNA DONISE – UNIVERSITÀ DI NAPOLI  
ARIANNA FERMANI – UNIVERSITÀ DI MACERATA  
CINZIA FERRINI – UNIVERSITÀ DI TRIESTE  
ELIO FRANZINI – UNIVERSITÀ DEGLI STUDI DI MILANO  
ALESSANDRA FUSSI – UNIVERSITÀ DI FIRENZE  
SHAUN GALLAGHER – UNIVERSITY OF MEMPHIS, USA  
ROBERTA GUCCINELLI – UNIVERSITÀ S. RAFFAELE, MILANO  
CHRISTOPH HORN – UNIVERSITÄT BONN  
JOEL KRUEGER – UNIVERSITY OF EXETER  
ROBERTA LANFREDINI – UNIVERSITÀ DI FIRENZE  
FEDERICO LEONI – UNIVERSITÀ DI VERONA  
ENRICA LISCIANI PETRINI – UNIVERSITÀ DI SALERNO  
MAURO MAGATTI – UNIVERSITÀ CATTOLICA, MILANO  
PAOLO AUGUSTO MASULLO – UNIVERSITÀ DELLA BASILICATA, POTENZA  
MAURIZIO MIGLIORI – UNIVERSITÀ DI MACERATA  
LUIGINA MORTARI – UNIVERSITÀ DI VERONA  
LINDA NAPOLITANO – UNIVERSITÀ DI VERONA  
RICCARDO PANATTONI – UNIVERSITÀ DI VERONA  
CLAUDIO PAOLUCCI – UNIVERSITÀ DI BOLOGNA  
ELENA PULCINI – UNIVERSITÀ DI FIRENZE  
MASSIMO RECALCATI – UNIVERSITÀ DI PAVIA  
ROCCO RONCHI – UNIVERSITÀ DELL’AQUILA  
ALESSANDRO STAVRU – UNIVERSITÀ DI VERONA  
HOLMER STEINFATH – UNIVERSITÄT GÖTTINGEN  
SALVATORE TEDESCO – UNIVERSITÀ DI PALERMO  
ÍNGRID VENDRELL FERRAN – FREIE UNIVERSITÄT, BERLIN  
DAN ZAHAVI – KØBENHAVNS UNIVERSITET (UNIVERSITY OF COPENHAGEN)  
WEI ZHANG – 中山大学 (SUN YAT-SEN UNIVERSITY, GUANGZHOU, CHINA)

# Thaumàzein – 8, 2020

## Morphology, Plasticity, and Transformation between Philosophy and Biology

*Edited by*  
*Guido Cusinato, Rosa Maria Lupo,*  
*Alessandro Minelli, Salvatore Tedesco*



# CONTENTS

*Editors' Introduction: Morphology, Organism, Evolution* 7

## PART I

### THE NEXUS BETWEEN MORPHOLOGY AND EVOLUTION

ALESSANDRO MINELLI

*Living Forms in Becoming Between Old Constraints and  
Unexpected Opportunities of Change* 22

VALERIA MAGGIORE

*Fantastic Morphologies:  
Animal form between Mythology and Evo-Devo* 39

GREGORIO TENTI

*The Living Difference.  
Morphological Issues in Ruyer, Simondon and Deleuze* 59

MATHILDE TAHAR

*The "History" of Biodiversity.  
A Bergsonian Look at the Theory of Evolution* 89

## PART II

### MORPHOLOGY, PLASTICITY, CONTINGENCY, AND FREEDOM

PIER ALBERTO PORCEDDU CILIONE

*Beyond the arché. Aristotle, Goethe, Heidegger, Schürmann* 107

MARKUS OPHÄLDERS

*Geniale Übersetzungen. Goethe – Benjamin – Spengler* 127

ROSA MARIA LUPO  
*Beyond the Eidetics of Living Beings:  
Contingency, Plasticity, Individuality* 145

SALVATORE TEDESCO  
*Meta-Identität / Unstable identities:  
Towards a Plastic Morphology* 172

ANDREA ZHOK  
*Identity, Freedom, Emergence.  
A Reflection on the Meaning of Action.* 188

MIRKO DI BERNARDO  
*Form, Function and Value in the Emerging and  
Self-Organizing Processes of the Natural Evolution* 204

**PART III**  
**UEXKÜLL'S CONCEPTS OF ORGANISM AND *UMWELT***

GUIDO CUSINATO  
*Body Enactivism and Primordial Affectivity.  
Max Scheler and Jacob von Uexküll's Aporia* 226

CARLO BRENTARI  
*Kantian Monads in a Platonic World. Some Remarks on the  
Philosophical Background of Jakob von Uexküll's Umweltlehre* 246

SPYRIDON A. KOUTROUFINIS  
*Organism, Self, Umwelt: A New Approach to  
Organismic Individuality* 260

## EDITORS' INTRODUCTION: MORPHOLOGY, ORGANISM, EVOLUTION

The dialogue between philosophy and life sciences has increasingly intensified over the last decades, developing a prolific exchange network that leads the former to face the question of life in the light of the rich patrimony of knowledge offered by the latter, while encouraging the latter to reflect upon the structures and categories of being as an ontological texture of the living world.

An overview of this fertile research field is presented in the current issue of *Thaumàzein*, which aims in particular to elucidate the conceptual constellation of morphology, organism, and evolution that is one of the central topics of the debate, involving, along with philosophers from various disciplines and life scientists, also scholars of the so-called theoretical biology (or metabiology). Actually, by questioning life and the complexity of its expressions from the biological level to the semantic-symbolic one, philosophy is not new to such exchanges with science. A first example of this interaction is provided by the so-called pre-Socratic thinkers and subsequently by Aristotle, whose investigations keep attracting the attention of scholars for a series of valuable intuitions in the biological field. Nonetheless, the contemporary research, to which the present issue aims at offering a contribution, detects in Goethe's age its fundamental reference in the philosophical and scientific tradition.

Goethe observes the living beings from a kind of eidetic perspective that in many ways seems to anticipate the phenomenological inquiry, from Husserl and Scheler onward. He is interested in beings as forms and he expressly calls this project *Morphologie*, which he understands to be an inquiry into form. His aim is to explore the entire reality, from its inorganic manifestations to the human being and its spiritual expressions. According to Goethe, every being has a phenomenal nature that can be perceived, seen and observed, even though each form is not ontologically determined and fixed (*Gestalt, Bild*), but mobile and in constant becoming, being involved in a process of "formation" (*Bildung*) by means of "transformation" (*Umbildung*). Before Goethe, *Bil-*

*dung* was generally identified with the capacity of receiving an external form in a passive way, like clay or soft wax can receive the imprinting of a seal. According to Goethe, instead, a living being is the subject of *Bildung* that is not a passive condition in which a predetermined form is impressed; rather, *Bildung* means the possibility of constant creation of new forms in a process of transformation that cannot be reduced to mere adaptation. The most immediate philosophical consequence of this perspective is represented by Schelling's philosophy of nature. He conceives of the organism as being the expression of a circular and retroactive causality inasmuch as, for him, the temporal cause-effect relation is no longer to be assumed in the sense of succession, but rather in that of simultaneity. In this relation, the effect exceeds the cause. In this respect, Schelling seems to anticipate Jonas by establishing an essential connection between organism and freedom, and defining the organism as a physical schema of freedom.

The relevance of Goethe's theoretical project lies in its eidetic character, which derives from its ambition to grasp the *Urform*, that is to say, the original prototype of every kind. However, his conception of form also bears many similarities with the contemporary notion of form as the result of an ontological dialectic between invariance and transformation at the core of reality. This thesis recurs in various essays published in this issue. It represents a *Leitmotiv* around which the various scholars investigate the question of the living being in a sort of intermediate space between nature and art, natural and artistic forms.

Without entering into details here about the history of morphology, it is important to observe that Goethe's project does not immediately receive the attention it deserves at least from philosophy, at the time dominated by Hegel's perspective. A year before his death in 1832, on the occasion of the third edition of *Metamorphosis of Plants*, the elderly Goethe expresses his profound regret for being known as a poet, but not seriously considered as a scientist or a philosopher of nature despite his scrupulous commitment to the study of the natural organic and physical phenomena, due to his understanding of morphology as being a science ancillary to physiology.

However, the foundations of morphology have already been laid; at approximately the same point in history, Burdach also uses the same



term to designate a doctrine of form concerned with studying the laws of development of organisms. From this point forward, a long tradition of morphological studies has developed that has not always been exempt from aporias and crises. Today morphology is conceived more as a methodological tool than as a proper discipline. It can also be seen as a methodological approach for a multidisciplinary research field that, also drawing on the Goethean matrix, focuses on those levels of structural designs called building plans (*Baupläne*). The *Baupläne* show how form and function essentially constitute an ontological relationship through which a living form comes into being, develops, and articulates as an emerging reality. This perspective gives rise to many questions: whether, for instance, an organism may be assumed as an autopoietic system or as a heteropoietic process; or how the individual's ontogenesis can be considered to be an open epigenetic development by posing the relation between every individual and its species.

However, in the field of knowledge, we are witnessing today a significant relaunch of the morphological perspective after several disputes about its validity, including the one involving Uexküll, or after the paradigm of modern synthesis reduced its heuristic calibre. Nevertheless, Uexküll's critical point of view must not mislead us since he is the proponent of a conception of the living organism whose constitution, being, and behaviour cannot be reduced to physicalist explanations on a mathematical basis. This aspect is another common point emerging from the different essays in this issue. Various scholars propose an "alternative logic" to understand life and its processuality, expressly underlining the limits of mechanistic models of explanation. This common position has doubtless much to do with a metamorphic conception of the living organism, which is already at the core of Goethe's theory.

Indeed, from the Goethean doctrine, the contemporary research retrieves, under the title of plasticity, the concept of metamorphosis as the structural constitution of living beings, hence definitively abandoning a vision of living beings as hypostatized substances rigid and steady in their essence. It views and analyses living beings as forms constantly subject to ongoing changes and continuous reconfigurations. After all, this position is also a central topic in today's Evo-Devo perspective, which is less "genocentric" in the awareness that there is no one-to-one

relationship between genes and phenotypes. Once again, emphasis is placed on the impossibility to read the living world only according to a reductionist model or a hard naturalism while we need – as Habermas would suggest – a softer naturalism able to bypass the gnoseological limits of radical physicalism. Such a view can already be traced back to Goethe and Bergson. They can be regarded as inaugurators of a philosophy of the living being endowed with its own categories that cannot be reduced to those of physics. However, such a theoretical approach was subsequently sidelined by a reductive interpretation of biological sciences aiming to understand life by eliminating all categories not directly attributable to physical or chemical laws. As known, such a paradigm tried to generate families of forms through generative algorithms, which were often mathematically elegant (for example, fractals) but very far from biological reality. In other cases, adaptation was used as a kind of mechanistic model of ontological explanation for living beings.

From today's perspective, instead, natural selection can only act on the products of developmental mechanisms actually operating in nature. There are perfectly functional biological forms that, had they appeared, would have been very successful, yet never saw the light. At the same time, “monstrous” individuals are born even though their survival chances are so scarce that they do not even reach adulthood. Therefore, a morphological consideration of form leads to rethinking the concept itself of evolution beyond that of mere adaptation. For a time, in biological research, interest in form was the prerogative of developmental biology while it practically remained neglected by evolutionary biology. Nevertheless, research in recent decades has led to a reinterpretation of the concepts of evolution and evolutionism, focusing more on the problems of form and morphology. It is acknowledged that, in order to understand living forms as they exist in nature, one cannot be satisfied either with the functionalist logic of evolutionary biology or with the explanations provided by developmental biology in terms of ontogenetic processes: neither research line alone is sufficient to analyse living forms. Therefore, Evo-Devo teaches us that knowing the sequence of all the “building blocks” of life is not enough, since a biological individuality has also to be studied as a self-organization whose complexity makes an organism an affective individuality capable of interacting

with the environment. Today, biology refocuses not only on the form but also on subjectivity and biological individuality, which were marginalized during the 19<sup>th</sup> century, without falling back into vitalism.

We would also like to emphasize the role played by the particular connection between aesthetics and theoretical biology, which some of the essays of this issue tackle within the framework of a dialogue between philosophy and life sciences. This aspect appears to be especially relevant in the light of the turn of aesthetics towards *aesthesiology*, which today provides a broader understanding of living forms that bypasses the traditional Aristotelian distinction between *physei onta* and *techne onta*. Again, insofar as Goethe's morphology reworks this distinction by looking at reality as such, both natural and artistic, it may be seen as providing the matrix for overcoming it. We should not forget, *en passant*, the role of German physiologist and painter Carl Gustav Carus, who was also a friend of Goethe and who adopts a morphological perspective in art, making the close relation of science and art explicit.

The present issue is divided into three main sections: the first one includes the essays of Minelli, Maggiore, Tenti, and Tahar, and analyses the nexus between morphology and evolution; the second one, including the essays of Porceddu Cilione, Ophälders, Lupo, Tedesco, Zhok, and Di Bernardo, focuses on the relationship between morphology, plasticity, contingency, and freedom; the third one collects the essays of Cusinato, Brentari, and Koutroufinis, and explores the debate stirred around the concept of organism proposed by Uexküll.

In the first section, Alessandro Minelli analyses the relation between form and development and the reasons for the impossibility to refer to a single explanatory paradigm of the living forms, starting from Burdach's question about the principles of form and according to the contemporary position which denies the possibility for considering the form as a response to a function. One cannot investigate living forms by following only the logic of biological development, nor can one explain the ontogenetic processes only through the criterion of evolution. Rather, Minelli argues for integrating both points of view as in Evo-Devo, discussing the three cardinal elements of this perspective, namely the presence of systemic changes, the modularity, and the evolvability in the living world. By stressing the role of structural constraints work-

ing as conditions of possibility for changes and transformations, Minelli points to how phenotypic plasticity, as a proper character of living organisms, shows itself even in the absence of genotypic differences. In this sense, Minelli explores the main key topic of the present issue, namely the metamorphic form of the living being, on which Valeria Maggiore's contribution also insists.

She raises the question of biological difference between imaginary creatures and only apparently fantastic existing animals that fill us with astonishment. Hence, Maggiore examines the disparity of existing animals and its reasons as well as the conditions of possibility of the formal organization regulating the emergence of morphological novelties in nature. She also discusses how the extended evolutionary synthesis relaunches the morphological perspective, focusing both on the role of the "architect genes" or "morphogenes" responsible for the ontological syntax of animal organisms and on the power of the "architectural constraints" affecting (genetic and ontogenetic, physical and historical) development of the living forms.

Gregorio Tenti's philosophical starting point concerning the role of difference, conceived to be structurally lying in Being and, hence, life, is the access key for a transcendental morphogenetic understanding of the living form beyond its biological definition and constitution. In his attempt, Tenti refers primarily to two positions, namely Bergson's metaphysics of life beyond Darwinism and Canguilhem's philosophy of the living directly influenced by the morphological tradition, thus, recomposing the complex mosaic of the tradition of biomorphological studies both in Germany and France. At the same time, he deals with two main questions in morphology, namely 1) the epistemological problem of a knowledge of the living individuals and 2) the ontological problem of the consistency of becoming. The first problem, already well-known to Goethe and Kant, stems from the dilemma: on the one hand, the individuals are non-objectual beings; on the other, morphology aims at grasping the essence of the living beings as such, or rather the «impersonal, morphogenetical a priori act» in which each living being consists. The second problem implies a reflection on notions such as temporality, spatiality, and individuality, especially referring to Ruyer's, Simondon's, and Deleuze's thoughts.

Mathilde Tahar also investigates Bergson's philosophy, which she resorts to in order to ponder the limits of strictly evolutionary explanations. She argues that evolution cannot be conceived as a process towards an optimum and, therefore, she critically discusses Darwin's solution of natural selection as a mechanistic explanation for adaptation that would imply finalism. Tahar's essay draws the reader's attention to the dynamic structure of evolution, which proceeds through maladjustments, dissonances, conflicts, absurdities, inappropriateness, and regressions. In evolution, contingency plays an essential role which reveals its historical character insofar as evolution is "duration" and not mere succession. Hence, a mechanistic conception of evolution turns evolutionary explanations into vicious circles. And, most importantly, by not taking the organisms' internal constraints into account, evolutionary explanations prove to be insufficient in order to understand living organisms. Following Bergson, Tahar draws attention to the organism's essence as something unpredictable by its own nature that expresses the complexity and the contingent intersection of different and heterogeneous levels that can be distinguished only artificially. In this sense, biodiversity depends on the process of becoming understood as «a creative spiral of novelties».

The essays of the second section of the issue focus on the creative aspect in the world of forms that depend on contingency. Several authors rework Goethe's overcoming of the Aristotelian difference between nature and art. Pier Alberto Porceddu Cilione especially devotes his essay to rethinking the concept of nature, examining how some central concepts of aesthetics can contribute to the understanding of biological life. Porceddu Cilione not only points out that the natural world and the art world are related by a unitary play of forces, but also that there is an art of nature as well as a nature of art, therefore, the rigid distinction between art and nature must be bypassed. Thus, he calls the Goethean morphology into play since Goethe looks at the totality of Being as the true object of morphology. This totality is a creating processuality, even though this raises the questions of the relationship between the form of an entity and the eternal morphological matrix of Being. Being not only mimetic but also creative, art offers a study model of form. The morphological gaze is able to cross art and nature

transversally. Therefore, morphology can provide a common ground of reflection for both art and biology, by investigating the form-of-life and the form-of-art as *Bildung*. The concept of form as *Bildung* entails an antideterministic-mechanistic understanding of form, emphasizing its “free” character, its “gift” character.

Through a morphological investigation which eliminates the ultimate distinction between nature and art, nature and culture, nature and history, Markus Ophälders' text resorts both to Benjamin's conceptual translation of the main concepts of Goethe's morphology into those of his philosophy of history and his aesthetics (for instance, the resemanticization of the concept of *Urphänomen* as “origin”) and to Spengler's thought. Inspired by Goethe's philosophy of nature, Spengler assumes the cultural eras as living forms and living formation processes, such as plants subject to continuous metamorphosis. Both in Benjamin and Spengler, history is thematized as a natural phenomenon. Despite the role of human actions, history is “transformed” back into nature. Furthermore, Ophälders is specifically concerned with Goethe's way of conceiving the phenomenal essence of reality, hence the manifestative trait of the *Urphänomene*, namely of those phenomena that are sensibly perceived as *Erscheinungen*. This approach allows a kind of eidetic vision of form as the original form from which the other existing forms arise, despite Goethe's terminological revision after Schiller's criticism, which leads him to replace the concept of *Urpflanze* with the motto “*Alles ist Blatt*”. Even though Goethe abandons the idea that the essence can be experienced through a sensible perception, the leaf is a self-showing phenomenon that allows the knowledge of all other botanical appearances since through the leaf a form is given to the respective phenomena, a form different each time, but also consistently similar to a hypothetical original leaf. For Goethe, this kind of phenomenality is also at work in art, and, in this sense, Ophälders analyses the extension of Goethe's morphological project, which lies on a conception of form as a free givenness and manifestation.

Such a conception of form is deeply phenomenological and can also be found in Rosa Maria Lupo's essay, which investigates the question of the plasticity of form and its epistemological significance by putting metaphysics, phenomenology and morphology into a fruitful dialogue.

Lupo analyses Blumenberg's revision of the eidetic approach, which also lies at the core of Goethe's morphological project. In its attempt to understand the problem of eidetic variation by looking at some theses of biology, this approach is exposed to the risk of losing the sense of the continuous plastic morphogenesis of living beings. The problem of eidetic variation is both an ontological and an epistemological question. Indeed, the emphasis on the intelligible character of form, which is derived from the possibility of subsuming the individuals under the universal generalities of kinds and species to which they belong, implies a reduction of the role of contingency, which actually is one of the essential elements that determine ontogenetic acts and epigenetic development of the individual being at all levels of the living being, from the biological to the symbolic one. Nevertheless, renouncing the eidetic intelligibility of form draws the morphological project into question. In its constant dialogue with Goethe's morphology, Blumenberg's revisited phenomenology of the living world aims at respecting the delicate balance of chance and necessity which life consists in. It also draws on the Goethean conception of metamorphosis as a tension between a "subversive" force that tends to destroy the form and a "conservative" one, maintaining it instead.

In Salvatore Tedesco's essay, Sebald's morphological writing is a powerful sign of this dialectic tension within life between its loss and the possibility of overcoming its defeat. In this sense, Tedesco analyses Sebald's reference to Bilz and his investigation of identity, hominisation, and metamorphosis. For Bilz, human identity formation is a conflictual process concerning the very relationship between the living being – in its body and its dynamic and plastic essence – and its vital environment. In this much troubled formation process, a dialogical, metamorphic, relational sense of identity emerges. Furthermore, Bilz's psychopathological research focuses not only on the plastic dimension of the human affective world, it also examines the «reciprocal and motivated replacement of formal configurations», posing the existence of two main levels in the identity constitution of the human beings, namely the so-called *biologische Radikale* and *identische Exekutive* – which are marked by the ability both to repeat their ancestral foundation and to transform and shape a proper and autonomous inner world. Bilz's



biological-relational interpretation of the human being offers a plural and dynamic conception of organic forms and their functional systems which reveals the radical human openness to the contingency of experience and to the unrepeatable uniqueness of life and reality.

This uniqueness is also at the core of Andrea Zhok's essay, which discusses the changing character of the living being whose actions are driven by a «transformational logic» lying in a historical process. Actions are diachronic units whose meaning is fulfilled to the extent that they are embedded in a comprehensive horizon, i.e., in a story that includes three dimensions: biological, cultural, and personal. This horizon cannot be explained as a simple mechanical course. Instead, it is characterized by being «oriented towards», which determines that something has a value, a meaning for somebody. Therefore, the logic of the living beings cannot be described through an erroneous adaptationist paradigm that explains the essence of biological properties as the phenotypic traits, referring to the adaptation mechanism and hence to natural selection. On the contrary, natural selection «works on life and does not constitute life», meaning that natural selection operates through possibilities and not necessities. Zhok then discusses the meaning of the biological properties as emergent properties. These emerge in the sense that they depend on the configuration of the parts of the living being. They are relational properties in the sense that they are a meeting point between a certain given configuration of the living being and its given surrounding world. Hence, Zhok argues for a way of understanding that focuses on what a property can currently do, refusing to acknowledge that a new property's emergence is strictly determined by the old one. In this sense, it is possible to consider natural evolutionary history as «a process of progressive possibilizations». This kind of description can also be adopted both for the cultural evolutionary history and the individual life, which can be seen as a «space» of possibilization where each action has «a possibilizing character» and is «creative of new possibilities, primarily for the course of life of the agent itself». In all three dimensions, there is no deterministic order, as Mirko Di Bernardo also points out.

In his essay, Di Bernardo analyses the process of continuous auto-poiesis, which is what a living system is, by following Kauffman's theory



of biological complexity, which considers highly organized living forms as plastic compromises between variability and specificity. Di Bernardo dwells extensively on the core of this theory, namely the autonomous agent defined as a physical system capable of acting for its own advantage in a given environment. According to Kauffman, an autonomous agent has a relational character, and in particular it is a relational convergence of matter, energy, and information, where information means a «quality [that is] able to generate and regulate the entire system». This feature transforms an autonomous agent into a living, cognitive, intentional system which also needs to be analysed semantically, insofar as such a system makes use of symbols and signs. Moreover, a living system is an expression of a “know-how” capacity that opens the system to the ethical sphere given that autonomous agents can act for their advantage and self-preservation according to their representations connected to meanings and values they give and behaviours and purposes they have. Di Bernardo points out the difference between simple agents and complex autonomous ones like human beings capable of good and evil, the latter entailing forms of self-awareness capable of responsibility and being able to create new meanings and make symbols in continuous processes of «production of forms» by proceeding through synthesis, cancellations, and integrations. Ultimately, life implies semantics, intentionality, and value.

As said above, despite his criticism of the morphological project, Estonian biologist Uexküll plays an important role in elucidating the relationship between the living organism and its environment. The essays in the third section of the issue are devoted in a more specific way to his position.

The project of biosemiotics emerges in Guido Cusinato's essay, which turns to Scheler's “enactive” phenomenology of the living being in his reworking of the most important concepts elaborated by Uexküll, especially that of *Bauplan*. Indeed, Scheler tries to solve Uexküll's aporia, which is also the starting point of Cusinato's inquiry, namely how the different living species can reciprocally communicate in spite of their existence in different environments. Scheler's answer is that the organism selects its *Umwelt* by «carving out» an ecological niche from the world. A «grammar of elementary expression» proper to each living

organism discloses the possibility of biosemiotic interaction between environments and living forms capable of active orientation within their own environment. The relationship between the living organism and its environment is made possible through the organism's drive structure and perceptive nature, which focuses on what is relevant to its life within the environment. The organism, on its part, determines what is relevant according to a valueception that takes place on the pre-representational level. The idea of plural environments (one for each species) and of an interaction between the species and their environments are Uexküll's legacy in Scheler's thought. Furthermore, according to the distinction between *Leib* and *Körper*, Scheler recognizes the lived body as capable of perception, i.e., of selection through inner and outer sense. Indebted to the Uexküllian notion of *Bauplan*, this perspective is the key to Scheler's «schematism of *Leib*», which he reworks enactively by stressing its «creative» as well as selective role. According to Uexküll, a living organism can create a construction plan and thereby a «magic environment», namely its significant and vitally relevant *Innewelt*, which can be thought of as a «world of semiotic markings» in which the organism acts in accordance with the biological markings it perceives as meaningful for its life. In this sense, such a world is also an operative one.

Uexküll's biological concept of *Umwelt*, his conception of a living organism as a perceptive and operative organism that can «*shape* and *share* their experienced reality», and his Kantian heritage regarding the topic of transcendental subjectivity also play a central role in Carlo Brentari's essay. Uexküll's notion of *Umwelt* is a multi-semantic one, insofar as it designates a subjective, species-specific, intersubjective, and inter-specific world. This world results from the organism's perception and action according to an anti-mechanistic paradigm of nature characterized by a teleological force (*Naturfaktor*) that allows a kind of harmony among the various needs and actions of the diverse species. In physiological, morphological, anatomical terms, the *Naturfaktor* is the construction plan, while it is subjectivity as concerns the behavioural sphere. Another central question in Brentari's essay is Uexküll's risk of solipsism due to the fact that, in his theory, the subject has the nature of a monad. Nevertheless, while Uexküll's conception has a Leibnizian

trait, a Platonic influence can be detected in the possibility of knowing the *Naturfaktor*. Similar to Plato's conception of ideas as mediators, four key functional circles play an intermediary role between the *Naturfaktor* and each living being, while the notion of *Bauplan* seems to present an Aristotelian teleological character. As a matter of fact, this Platonic aspect in Uexküll's theory emphasizes its anti-determinism and anti-mechanism, insofar as he assumes the animal's freedom to be a transcendental and semiotic way of being which discloses the possibility of action. This represents an overcoming of the Platonic paradigm «of the repetition of fundamental ideas».

The analysis of the «logic of organism» as opposed to a «logic of biological mechanism» is precisely that which lies at the core of Spyridon A. Koutroufinis' essay, which draws on the existence of *causal factors* like variables, parameters, and essential equations in order to determine the dynamic of a biological system. Causal factors can be intrinsic or extrinsic, but the peculiar trait of life is that there are no rigid borders between these factors insofar as the living organisms are dynamic ways of being constantly subject to change, thus, they are not mechanisms. Therefore, an organism is in a permanent processuality stemming from always new relations between these intrinsic and extrinsic factors. Moreover, there is also a difference between first-order and second-order intrinsic factors, the latter expressing the plasticity of the living beings and of their “fundamental organizing principle” according to which a living organism aims at the maintenance and perpetuation of its form of organization. The second-order intrinsic factor is conceived by Koutroufinis to be a process that fortifies the synergistic relationship between its elements. Individuality emerges from the «inextricable causal interweavement of its permanently occurring first-order processes». Despite the presence of constraints limiting the freedom of the living organism, Koutroufinis puts their role into perspective in order to propose a different understanding of selfhood for overcoming scientific materialism. In order to do that, he looks at Uexküll's concept of *Umwelt* in that it includes relevant aspects for the organism's life. Insofar as an organism produces a representation of its *Umwelt* thanks to its apperception process, its existence cannot be mathematically explained and, therefore, biology cannot be reduced to physics.

## EDITORS' INTRODUCTION

In publishing this issue of *Thaumàzein*, we hope that the dialogue between scholars from different disciplines will enhance an investigation of life that respects the complexity of its expressions and forms.

*Guido Cusinato, Rosa Maria Lupo, Alessandro Minelli, Salvatore Tedesco*

PART I  
THE NEXUS BETWEEN  
MORPHOLOGY AND EVOLUTION

## ALESSANDRO MINELLI

LIVING FORMS IN BECOMING  
BETWEEN OLD CONSTRAINTS AND  
UNEXPECTED OPPORTUNITIES OF CHANGE

TABLE OF CONTENTS: 1. *Understanding forms*; 2. *Living forms between development and evolution*; 3. *Systemic vs. modular changes*; 4. *Genotype and phenotype*.

### 1. *Understanding forms*

«We really understand a form when we know how it emerges from its principles». So Burdach,<sup>1</sup> in the pages of the first book where the word “morphology” (*Morphologie*) appears in the title. But what can be the principles of a form?

Decades of biology dominated by an evolutionary reading of the living world could lead us to focus on adaptation: form responds to a function and the forms of living beings change due to selection, i.e. depending on their fitness – the measure in which the different variants of a trait differently meet the demands of the environment.

This is certainly not the nature of the principles that Burdach called into question, but these are not unlike those that inspired Goethe, for example in his interpretation of the bodily organization of the plant and its parts, where everything is leaf (*Alles ist Blatt*) [Goethe 1790].

In the two centuries that separate us from the birth of morphology, the search for possible universals of form has sometimes turned towards the abstract aspects suggested by geometry (in particular, by topology), more often towards adventurous generalizations of the functional value of individual classes of shapes, an aspect we will not deal with in these pages.

---

<sup>1</sup> «wir streben, den Sinn und Ursprung der Gestalt aus höhern Begriffen zu entwickeln» [Burdach 1817, 43].

In the instances where the universals of form are sought in terms of geometry, the connection between the different forms does not necessarily have an explicit biological basis. Such a foundation is lacking even in the famous geometric transformations of D'Arcy Wentworth Thompson [1917], based on a purely visual equivalence between the body shapes of different animals. A modern version of this comparative approach to organic forms based on geometric relationships is geometric morphometrics.<sup>2</sup>

Some approaches to the geometry of organic forms have taken a different, generative path, through the formulation of algorithms that reproduce families of regular organic forms, e.g. inflorescences [Prusinkiewicz *et al.* 2007] or mollusc shells [Meinhardt 1998], up to the 'superformula' of Gielis [2003], which intends to unify a great variety of forms, biological (e.g. leaves) and not as different solutions of a single equation of the maximum generality.

A separate chapter is represented by models that use fractal geometry to describe complex shapes in which the same unit form is repeated several times on different scale, such as on the surface of a cauliflower or in the repeated branches of many fern fronds [Minelli 2018]. It should be noted, however, that a close resemblance between natural forms and those generated by these models is not necessarily a proof that the former are produced in the same simple, mathematically 'elegant' way as the latter.

## *2. Living forms between development and evolution*

In recent times, the never-abated dissatisfaction with a reading of living forms in purely functional terms has taken on new vigor, fueled by the spectacular progress that developmental biology has experienced over the last half century through an increasingly substantial contribution of molecular genetics. Natural selection can only act on those forms that have been actually built, that is to say on those that fall within the possible products of the developmental mechanisms actually operating

---

<sup>2</sup> Useful introductory works to geometric morphometrics are Bookstein 1991; Rohlf & Marcus 1993.

in nature. Before comparatively evaluating the fitness of the various phenotypes in a given environmental context, it is therefore reasonable to deepen our knowledge of their actual possibility (and probability) of realization. A couple of examples will help explaining this statement.

In earthworms, the number of segments into which the body is divided varies, even considerably, within each species and each individual population. For example, if the most frequent value is 105 segments, there will also be individuals with 104, 103 etc. and with 106, 107 etc. segments. A similar continuity in the numerical variation is not found, however, in the chilopods or centipedes, that is in the scolopenders and in their closest relatives. In adult condition, these animals always have an odd number of leg pairs. This number is fixed in some groups, but can instead be variable, even considerably, although always avoiding even values. In geophilomorph centipedes the variation is quite evident: in a single population there can be for example individuals with 53, 55, 57, 59 or 61 pairs of legs, none however with 54, 56, 58 or 60. What are the reasons for the total absence of chilopods with an even number of pairs of legs? An explanation in functional terms is unthinkable: what disadvantage could derive, in fact, from having only one pair of legs in excess or in defect of 57 pairs? Moreover, it seems difficult to hypothesize a hereditary mechanism that completely excludes the production of individuals with an even number of pairs of legs by parents with any possible combination of odd numbers. It is far more reasonable to think that the absence of chilopods with an even number of leg pairs is due to the fact that these cannot be produced: in other words, there would be a constructive constraint, an intrinsic limit to the mechanism by which these animals produce the modular units (the segments, with a pair of legs each) of which their long trunk is formed.

Another instructive story of numbers is told by the giraffe's neck. Lamarck was the first author to use this animal to illustrate his evolutionary vision, according to which the morphological changes resulting from the repeated use of a body part end up being transmitted to the following generations. We can thus imagine that in ancient times giraffes had a neck much shorter than today but, being faced with the dry season, when in the savannah the only green leaves are found on the branches of the acacias at considerable height above the ground,



they used to stretch it in the attempt to reach the food. The repeated effort would have produced a progressive lengthening of the neck, which would have been regularly transmitted to the offspring. Through a long series of generations, the giraffe's neck would thus have reached the proportions it has today.

Acacias and summer drought also play an important role in the Darwinian-style scenario in which a population of giraffes appears, somewhat different from one another in terms of neck length. We expect that, as a rule, those with the longest neck are those that most easily manage to survive and reproduce. To the extent that the length of the neck depends on hereditary factors, there will thus be, from generation to generation, a slow but progressive increase in the average length of the neck, until the current proportions are eventually obtained. This is a functional, adaptive explanation of the peculiar shape of the neck of this mammal. But it is a partial explanation at best: it does not tell us, in fact, how to make a giraffe's neck or at least its skeletal scaffolding.

We can imagine indeed that this is constituted by a high number of cervical vertebrae (more than the seven elements that support a human's head), or by a few, very elongated cervical vertebrae (perhaps just seven, as in our species). From a functional point of view, there might be some small difference between one vertebral composition and another, but the solution to our doubt must be sought in another direction. We realize this when we discover that the cervical vertebrae of the giraffe are just seven, a number virtually fixed in all mammals [Minelli 2009]. We have reason to think that there has never been giraffes with cervical vertebrae in number other than seven, although it is easy to imagine that, had nature been able to produce a more numerous set, this could have been advantageous over a lesser number of cervical vertebrae with similar average length.

Centipedes and giraffes therefore invite thinking of biological forms that, had they appeared, would have been successful, in terms of functional adaptation, but 'simply' never saw the light. There are also reciprocal examples: 'monstrous' individuals whose chances of survival are uncertain, while it is certain that they will not be able to reproduce and therefore to transmit their characters, and yet they often reach adulthood, demonstrating that existing developmental mechanisms are

capable of constructing forms other than normal ones.

Developmental biology has long learned to use these abnormal individuals to improve our knowledge of morphogenetic processes; in addition to the ‘monsters’ occasionally found in nature, there are also those intentionally produced in suitable experimental conditions. Exemplary, from many points of view, are some *Drosophila* mutants, for example the so-called *Antennapedia*, in which a pair of legs replace the antennae. This anomaly can only be seen in the adult (in the previous stages, from embryo to larva to pupa, there are not antennae), so it is clear that the mutation does not hinder development, metamorphosis included. But an adult fly without antennae lacks chemical receptors that are indispensable for locating food and searching for partners: in other words, it is a total failure, from an adaptive point of view.

What can we learn from this perhaps unexpected counterpoint between flies without a future that can be produced nevertheless, and giraffes with twenty cervical vertebrates or scolopenders with twenty pairs of legs that cannot be built, although we can be sure that they would survive and reproduce? The lesson learned from these examples is that to understand living forms as these exist in nature we cannot be satisfied either with the functionalist logic of evolutionary biology, or with the explanations provided by developmental biology in terms of ontogenetic processes: separately taken, neither is sufficient to explain the biological forms we actually find in nature. However, we can attempt to integrate between the two approaches, following the recent program of evolutionary developmental biology (evo-devo).<sup>3</sup>

Evolutionary developmental biology began to take shape as an autonomous discipline only towards the end of the last century and is still searching for a precise identity [Arthur 2002; Müller 2008; Minelli 2015a]. It is often seen as a trading zone [Winther 2015] in which problems and methods of evolutionary biology confront those of developmental biology. Today, however, we are not only witnessing the overcoming (in itself a very important achievement) of the decades-long divergence between these two major branches of the life sciences [Amundson 2005], because in the context of evolutionary developmen-

---

<sup>3</sup> See Hall 1992; Arthur 2002; Minelli 2003, 2009, 2018; Carroll *et al.* 2005.

tal biology an original program has now taken shape, mainly focusing on three points: the origin of evolutionary novelties, modularity and, most important, evolvability. It will be useful to start from the latter, before briefly reviewing a series of aspects of the evolution of living forms that variously express the modularity of these and of the developmental processes that generate them.

The understanding of the relationships between genotype and phenotype has undergone a radical change with the lucid analysis of Pere Alberch [1991], which focused on the fundamental role of development and the constraints it poses to the opportunities for phenotype change. A problem therefore arose: what are the most likely, less likely and perhaps also impossible scenarios of change? In other words, the central question became one of evolvability [Hendrikse *et al.* 2007; Minelli 2017], that is the evolutionary path of living beings in what we can call the labyrinth of forms: phenotypic distances that are apparently easy to bridge may actually require difficult or unlikely changes at the genetic level while, on the contrary, seemingly large distances between two different phenotypes are sometimes bridged at the price of minor genetic changes.

Important news, for example, can be the consequence of a ‘simple’ iteration of a developmental process already at work in the same organism, with results depending on the number of iterations and the polarity of the axes along which these are realized. There is evidence, for example, of evolutionary leaps in the number of segments of the body as a consequence of a probable overall duplication of the entire series of segments of which the trunk of the animal is composed. This may be the origin of *Scolopendropsis duplicata*, a centipede that has approximately twice the number of leg pairs compared to all the other scolopenders [Chagas *et al.* 2008; Minelli *et al.* 2009], and of the millipedes of the genus *Dobrodesmus*, similarly ‘duplicated’ with respect to their closest relatives [Shear *et al.* 2016]. Of major consequence can however be a duplication that gives rise to a new body axis, according to the principle of paramorphism that expresses the correlations between construction and regionalization of the main body axis and the corresponding processes in the axes of the appendages of the same animal [Minelli 2000].

### 3. *Systemic changes and modular changes*

Provided that we retain a critical attitude with regard to a somewhat simplified taxonomy, it is useful to distinguish, in the context of the changes of living forms in development and evolution, between modular changes that concern exclusively (or almost exclusively) individual parts of the body, and systemic changes in which the entire body organization is deeply modified [Minelli 2015b]. Let's start with the latter.

#### 1) *Systemic changes*

A striking example of living forms resulting from a systemic change on an evolutionary scale is offered by the duckweeds, a small tribe of plants floating on the surface of freshwater ponds and ditches. In the most known and common representatives of this group, those belonging to the genus *Lemna*, there are neither branches nor leaves: the whole plant is just a small floating disk a few millimeters in diameter; its almost invisible flowers are reduced to a tiny ovary (female flowers) or a rudimentary stamen (male flowers). But there are also more simplified forms, overwhelmed by a systemic simplification that in the case of *Wolffia arrhiza* reduces the plant to a grain of green matter of just one mm in diameter, or even less. These simplified forms appear even more extreme when compared to the calla lilies, an example of the typical (not simplified) morphology of the plants of the arum family, to which the duckweeds also belong.

#### 2) *Modular changes*

The independence enjoyed by the different parts of the body, from the point of view of the developmental processes from which they are generated, is clearly visible in the regeneration of lost parts, as in the case of the lizard's tail. However, to a greater or lesser extent, this also occurs during the normal development of the organism, which can therefore be described as a system of local modules dominated by distinct and specific developmental dynamics: «Modules are assemblages of parts

that are tightly integrated internally by relatively many and strong interactions but relatively independent of one another because there are only relatively few or weak interactions between modules» [Klingenberg 2005, 6].

Developmental modularity is the condition that allows a whole series of important evolutionary changes (developmental reprogramming [Arthur 2000, 2002]), for which variations of ontogenetic processes, even of modest size, may be sufficient. Three main types are recognized – heterometry, heterotopy, heterochrony – which involve, in the order, changes in quantitative (metric or meristic, positional and temporal) aspects of the production of individual parts of the body during development.

Heterometry is a significant variation of the size relationship between two parts of the body. An extreme example is offered by the nematode *Sphaerularia bombi*. In this tiny parasitic worm, the reproductive system of the mature female hypertrophies up to become much larger than the animal itself and, following prolapse from the genital opening, it continues to grow outside the body of the worm, while the latter ends up representing only a small appendage of its reproductive organs [Poinar & van der Laan 1972].

Heterotopy is the term used to describe a change in shape that occurs during the development of the individual or in the evolutionary history of a group of organisms, affecting the spatial relationships of a single module in respect to the remaining of the body architecture. This is the case, for example, of flatfish. These, at the beginning of the development, have a normal bilateral symmetry, but in the following phases one of the eyes migrates towards the opposite side of the head.

Heterochrony is an evolutionary change in the rates or timing of developmental processes. There are several types of heterochrony, characterized by different forms of temporal change: the time of onset of an ontogenetic process (for example, the first visible evidence of the forming brain) can be anticipated or postponed; in turn, the moment at which it ends can be anticipated or delayed; and the speed with which the process takes place can also vary.

The traditional approach to heterochrony [de Beer 1930, 1940; Gould 1977; McNamara 1986; McKinney & McNamara 1991] took into account almost exclusively the variations in the temporal course of somatic

growth with respect to reaching sexual maturity. Thus two main forms of heterochrony were recognized: paedomorphosis and peramorphosis. In the first case the animal reaches maturity while maintaining juvenile or larval characteristics in the somatic features, in the second the growth period is prolonged and maturation is delayed. The most recent research on heterochrony is based, instead, on the recognition of a more extended modularity of the developmental processes, thus allowing an analysis of the variations in the order in which the different events occur within the ontogenetic sequence (sequence heterochrony [Velhagen 1997; Smith 2001, 2002; Jeffery *et al.* 2002a, 2002b, 2005]). An example of sequence heterochrony is provided by the order in which the anterior and posterior limbs first appear in the embryo or the larva of different groups of terrestrial vertebrates: in the newt, in the hedgehog and in the mole, for example, the forelimbs appear first, in some anuran amphibians the opposite occurs, while in birds and in many mammals the two pairs of limbs appear simultaneously [Bininda-Emonds *et al.* 2007].

Classic examples of heterochrony are those of animals that reach sexual maturity while preserving a larval aspect, such as the olm (*Proteus anguinus*), the blind cave amphibian of the karstic regions between the Isonzo River and the South of Bosnia-Herzegovina, that maintains gill breathing throughout life, typical of the larvae of its relatives (newts, etc.) which instead metamorphose into adults that breath atmospheric oxygen.

#### 4. *Genotype and phenotype*

The clamorous success of molecular biology and the explosive development of studies on the genetic control of developmental processes in recent decades could suggest that a thorough knowledge of the genotype of an animal or plant is sufficient to predict its structure. The possibility of “computing” an embryo has been discussed.<sup>4</sup> But this would be a

---

<sup>4</sup> «Will the egg be computable? That is, given a total description of the fertilized egg – the total DNA sequence and the location of all proteins and RNA – could one predict how the embryo will develop? This is a formidable task [...]. It may, however, be feasible if a level of complexity of description of cell behavior can be chosen that

hasty conclusion. In fact, the path from the genotype to the phenotype is anything but simple [Alberch 1991; Draghi & Wagner 2008; Pigliucci 2001; West-Eberhard 2003]. It is rare that the expression of a gene corresponds precisely and unambiguously to the production of a given phenotypic trait. Generally speaking, the expression of one gene will be involved in many traits (pleiotropy), while identical or almost identical traits can be achieved even in the presence of differences in the genes or in the gene networks involved in their control (convergence or redundancy). Moreover, the phenotype that actually shows up depends, to a greater or lesser extent, also on influences from the environment in which development takes place.

### *1) Not everything from genes*

Phenotypic plasticity<sup>5</sup> is the ability to produce different phenotypes in the absence of genetic differences between individuals: which phenotype is actually obtained depends instead on the environmental conditions to which the animal was exposed in a (generally early) critical phase of its development [Pigliucci *et al.* 2006]. The best known example of phenotypic plasticity is probably the development of a female bee into either a fertile queen or a sterile worker: in this case, the factor responsible for the production of one or the other phenotype is the food (with or without royal jelly) that the insect received during the larval stage.<sup>6</sup> In the alligator and in other reptiles, under environmental control is the determination of sex, which depends on the temperature at which the egg is incubated [Janzen & Phillips 2006].

Recent studies have shown how easily alternative phenotypes controlled by the environment can sooner or later fall under genetic control [Brisson 2010]. In the pea aphid (*Acyrtosiphon pisum*) individuals of either sex can be winged or wingless, but this difference has different

---

is adequate to account for development but that does not require each cell's detailed behavior to be taken into account» [Wolpert 1994, 571-572].

<sup>5</sup> See Fusco & Minelli 2010; Pigliucci 2001; Schlichting & Pigliucci 1998; West-Eberhard 2003, 2005.

<sup>6</sup> In the case of ants, mechanisms underlying cast determination are more complex [Abouheif, Wray 2002].

causes in the male, where it is the expression of a genetic polymorphism, and in the female, where the presence or the absence of wings is instead a case of polyphenism, i.e. it represents the response to different environmental signals. However, the difference between the two conditions is subtle, since the gene responsible for the development of the wings in the male also plays a role in the response of the female to the environmental signals [Braendle *et al.* 2005a, 2005b].

## 2) *Whose genes?*

In many animals, including humans, normal life depends on a functional association between cells of different genetic identity: only a part of these derives from the zygote, the others are bacteria of many different species. Collectively, these bacterial cells form a microbiome that accompanies the animal throughout its life and strongly influences its vital processes. We can therefore state that the biological system that we usually call an individual is actually a consortium of functionally integrated animal and microbial cells [Gilbert *et al.* 2012; Gilbert & Epel 2015].

The best known multigenomic biological systems are the lichens, each of which is the product of a symbiotic relationship between a fungus and an alga. In many cases, the individual species of lichens (or rather, as we prefer to say today, the individual species of lichenized fungi) have precise and recognizable forms, expressions of processes of growth and development that depend jointly on the genomes of the fungus and the alga. Even more specific and predictable are the shapes of plant galls, especially of those that are induced by the puncture of plant tissues by the different species of cynipid wasps. From the point of view of comparative morphology and morphogenesis, lichens and galls would indeed deserve much closer attention than they have got up to now [Minelli 2017].



## References

- Abouheif, E., Wray, G.A. [2002], Evolution of the gene network underlying wing polyphenism in ants, in: *Science* 297 (5579), 249-252.
- Alberch, P. [1991], From genes to phenotype: dynamical systems and evolvability, in: *Genetica* 84 (1), 5-11.
- Amundson, R. [2005], *The Changing Role of the Embryo in Evolutionary Thought: Roots of Evo-Devo*, Cambridge, Cambridge University Press.
- Arthur, W. [2000], The concept of developmental reprogramming and the quest for an inclusive theory of evolutionary mechanisms, in: *Evolution & Development* 2 (1), 49-57.
- Arthur, W. [2002], The emerging conceptual framework of evolutionary developmental biology, in: *Nature* 415 (6873), 757-764.
- Bininda-Emonds, O.R.P., Jeffery, J.E., Sánchez-Villagra, M.R., Hanken, J., Colbert, M., Pieau, C., Selwood, L., ten Cate, C., Raynaud, A., Osabutey, C.K., Richardson, M.K. [2007], Forelimb-hindlimb developmental timing across tetrapods, in: *BMC Evolutionary Biology* 7, 182.
- Bookstein, E.L. [1991], *Morphometric Tools for Landmark Data: Geometry and Biology*, Cambridge, Cambridge University Press.
- Braendle, C., Caillaud, M.C., Stern, D.L. [2005a], Genetic mapping of *aphicarus*: a sex-linked locus controlling a wing polymorphism in the pea aphid (*Acyrtosiphon pisum*), in: *Heredity* 94 (4), 435-442.
- Braendle, C., Friebe, I., Caillaud, M.C., Stern, D.L. [2005b], Genetic variation for an aphid wing polyphenism is genetically linked to a naturally occurring wing polymorphism, in: *Proceedings of the Royal Society B: Biological Sciences* 272 (1563), 657-664.
- Brisson, J.A. [2010], Aphid wing dimorphisms: linking environmental and genetic control of trait variation, in: *Philosophical Transactions of the Royal Society B: Biological Sciences* 365, 605-616.
- Burdach, K.F. [1817], *Über die Aufgabe der Morphologie*, Leipzig, Dyk.
- Carroll, S.B. [2005], *Endless Forms Most Beautiful: The New Science*

*of Evo Devo and the Making of the Animal Kingdom*, New York, NY, Norton.

- Chagas-Júnior, A., Edgecombe, G.D., Minelli, A. [2008], Variability in trunk segmentation in the centipede order Scolopendromorpha: a remarkable new species of *Scolopendropsis* Brandt (Chilopoda: Scolopendridae) from Brazil, in: *Zootaxa* 1888, 36-46.
- de Beer, G.R. [1930], *Embryology and Evolution*, Oxford, Clarendon Press.
- de Beer, G.R. [1940], *Embryos and Ancestors*, Oxford, Clarendon Press.
- Draghi, J., Wagner G.P. [2008], Evolution of evolvability in a developmental model, in: *Evolution* 62, 301-315.
- Fusco, G., Minelli, A. [2010], Phenotypic plasticity in development and evolution, in: *Philosophical Transactions of the Royal Society B: Biological Sciences* 365, 547-556.
- Gielis, J. [2003], A generic geometric transformation that unifies a wide range of natural and abstract shapes, in: *American Journal of Botany* 90 (3), 333-338.
- Gilbert, S.F., Epel, D. [2015], *Ecological Developmental Biology: The Environmental Regulation of Development, Health, and Evolution*, 2nd ed., Sunderland, Sinauer.
- Gilbert, S.F., Sapp, J., Tauber, A.I. [2012], A symbiotic view of life: we have never been individuals, in: *The Quarterly Review of Biology* 87 (4), 325-341.
- Goethe, J.W. von [1790], *Versuch die Metamorphose der Pflanzen zu erklären*, Gotha, Ettingersche Buchhandlung.
- Gould, S.J. [1977], *Ontogeny and Phylogeny*, Cambridge (MA), The Belknap Press of Harvard University Press.
- Gould, S.J. [2000], Of coiled oysters and big brains: how to rescue the terminology of heterochrony, now gone astray, in: *Evolution & Development* 2 (5), 241-248.
- Hall, B.K. [1992], *Evolutionary Developmental Biology*, London, Chapman & Hall.
- Hendrikse, J.L., Parsons, T.E., Hallgrímsson, B. [2007], Evolvability as the proper focus of evolutionary developmental biology, in: *Evolution & Development* 9 (4), 393-401.

- Høeg, J.T. [1985], Cypris settlement, kentrogon formation and host invasion in the parasitic barnacle *Lernaeodiscus porcellanae* (Müller) (Crustacea: Cirripedia: Rhizocephala), in: *Acta Zoologica (Stockholm)* 66 (1), 1-45.
- Janzen, F.J., Phillips, P.C. [2006], Exploring the evolution of environmental sex determination, especially in reptiles, in: *Journal of Evolutionary Biology* 19 (6), 1775-1784.
- Jeffery, J.E., Bininda-Emonds, O.R.P., Coates, M.I., Richardson, M.K. [2002a], Analyzing evolutionary patterns in amniote embryonic development, in: *Evolution & Development* 4 (4), 292-302.
- Jeffery, J.E., Bininda-Emonds, O.R.P., Coates, M.I., Richardson, M.K. [2005], A new technique for identifying sequence heterochrony, in: *Systematic Biology* 54 (2), 230-240.
- Jeffery, J.E., Richardson, M.K., Coates, M.I., Bininda-Emonds, O.R.P. [2002b], Analyzing developmental sequences within a phylogenetic framework, in: *Systematic Biology* 51, 478-491.
- Klingenberg, C. P. [2005]. Developmental constraints, modules and evolvability, in: B. Hallgrímsson, B. K. Hall (eds.), *Variation: A Central Concept in Biology*, Burlington, MA, Elsevier, 219-247.
- McKinney, M.L., McNamara, K.J. [1991], *Heterochrony. The Evolution of Ontogeny*, New York/London, Plenum.
- McNamara, K.J. [1986], A guide to the nomenclature of heterochrony, in: *Journal of Paleontology* 60 (1), 4-13.
- Meinhardt, H. [1998], *The Algorithmic Beauty of Sea Shells*, Berlin, Springer.
- Minelli, A. [2000], Limbs and tail as evolutionarily diverging duplicates of the main body axis, in: *Evolution & Development* 2, 157-165.
- Minelli, A. [2009], *Forms of Becoming*. Princeton, Princeton University Press.
- Minelli, A. [2015a], Grand challenges in evolutionary developmental biology, in: *Frontiers in Ecology and Evolution* 2: 85.
- Minelli, A. [2015b], Morphological misfits and the architecture of development, in: E. Serrelli, N. Gontier (eds.) *Macroevolution. Explanation, Interpretation and Evidence*, Cham, Springer, 329-343.

- Minelli, A. [2017], Lichens and galls – two families of chimeras in the space of form, in: *Azafea* 19, 91-105.
- Minelli, A. [2018], *Plant Evolutionary Developmental Biology*, Cambridge, Cambridge University Press.
- Minelli, A., Chagas-Júnior, A., Edgecombe, G.D. [2009], Saltational evolution of trunk segment number in centipedes, in: *Evolution & Development* 11, 318-322.
- Müller, G.B. [2008], Evo-devo as a discipline, in: A. Minelli, G. Fusco (eds.), *Evolving Pathways. Key Themes in Evolutionary Developmental Biology*, Cambridge, Cambridge University Press, 5-30.
- Pigliucci, M. [2001], *Phenotypic Plasticity: Beyond Nature and Nurture*, Baltimore (MD), John Hopkins University Press.
- Pigliucci, M., Murren, C.J., Schlichting, C.D. [2006], Phenotypic plasticity and evolution by genetic assimilation, in: *Journal of Experimental Biology* 209, 2362-2367.
- Poinar, G.O., van der Laan, P.A. [1972], Morphology and life history of *Sphaerularia bombi*, in: *Nematologica* 18 (2), 239-252.
- Prusinkiewicz, P., Erasmus, Y., Lane, B., Harder, J.D., Coen, E. [2007], Evolution and development of inflorescence architectures, in: *Science* 316 (5830), 1452-1456.
- Rohlf, F.J., Marcus, L.F. [1993], A revolution in morphometrics, in: *Trends in Ecology & Evolution* 8 (4), 129-132.
- Schlichting, C.D., Pigliucci, M. [1998], *Phenotypic Evolution: A Reaction Norm Perspective*, Sunderland, MA, Sinauer.
- Shear, W.A., Ferreira, R.L., Iniesta, L.F.M., Marek, P. [2016], A millipede missing link: Dobrodesmidae, a remarkable new polydesmidan millipede family from Brazil with supernumerary rings (Diplopoda, Polydesmida), and the establishment of a new suborder Dobrodesmidea, in: *Zootaxa* 4178 (3), 371-390.
- Smith, K.K. [2001], Heterochrony revisited: the evolution of developmental sequences, in: *Biological Journal of the Linnean Society* 73 (2), 169-186.
- Smith, K.K. [2002], Sequence heterochrony and the evolution of development, in: *Journal of Morphology* 252 (1), 82-97.

- Thompson, D'A.W. [1917], *On Growth and Form*, Cambridge, Cambridge University Press.
- Velhagen, W.A. Jr. [1997], Analyzing developmental sequences using sequence units, in: *Systematic Biology* 46 (1), 204-210.
- West-Eberhard, M.J. [2003], *Developmental Plasticity and Evolution*, New York, Oxford University Press.
- West-Eberhard, M.J. [2005], Developmental plasticity and the origin of species differences, in: *Proceedings of the National Academy of Sciences of the United States of America* 102 (Suppl 1), 6543-6549.
- Winther, R.G. [2015], Evo-devo as a trading zone, in: A.C. Love (ed.), *Conceptual Change in Biology: Scientific and Philosophical Perspectives on Evolution and Development*, Dordrecht, Springer, 459-482.
- Wolpert, L. [1994], Do we understand development?, in: *Science* 266 (5185), 571-572.

## **Keywords**

Development; Evolution; Evolutionary Developmental Biology; Evolvability; Fractals; Genotype-Phenotype Relationship; Heterochrony; Heterometry; Heterotopy; Modularity; Morphology; Multigenomic System; Paramorphism; Systemic Change

## **Abstract**

What does it mean to understand a biological form? Traditional approaches have tried to generate families of form through generative algorithms, often mathematically elegant (e.g., fractals) but very far from biological reality, or to explain it in terms of adaptation. In recent times, a different reading of living forms has been fueled by progress in developmental biology. The key point is that natural selection can only act on the products of the development mechanisms actually operating in nature. There are biological forms that, had they appeared, would have been successful, but simply never saw the light. There are also reciprocal examples of 'monstrous' individuals whose chances of survival are uncertain and are not able to reproduce, yet they often reach adulthood, demonstrating that existing developmental mechanisms are capable of constructing forms other than normal ones. Thus, to understand living forms as these exist in nature we cannot be satisfied either with

the functionalist logic of evolutionary biology, or with the explanations provided by developmental biology in terms of ontogenetic processes: separately taken, neither is sufficient to explain the biological forms we find in nature. However, we can attempt to integrate between the two approaches, following the recent program of evolutionary developmental biology (evo-devo). Within this discipline, an original program has taken shape, focusing on evolvability, modularity and the origin of evolutionary novelties. Evolutionary and developmental changes of living forms can be modular or systemic. Modularity allows different kinds of development reprogramming: heterochrony, heterotopy, heterometry, which involve, in the order, changes in temporal, positional and quantitative aspects of the production of individual body parts during development. Despite the explosive development of studies on the genetic control of developmental processes, a thorough knowledge of the genotype of an animal or plant is not sufficient to predict its structure. The expression of one gene is generally involved in many traits (pleiotropy), while identical or almost identical traits can be achieved even in the presence of differences in the genes or in the gene networks involved in their control (convergence or redundancy). Moreover, the phenotype that actually shows up depends also on influences from the environment in which the development takes place (phenotypic plasticity), and on often standing and specific interactions with other organisms, as in the fungus-alga symbiosis of lichens and the interactions of multicellulars – humans included – with their microbiome.

Alessandro Minelli  
Department of Biology, University of Padova  
Via U. Bassi 58 B  
I 35131 Padova  
E-mail: [alessandro.minelli@unipd.it](mailto:alessandro.minelli@unipd.it)

## VALERIA MAGGIORE

FANTASTIC MORPHOLOGIES:  
ANIMAL FORM BETWEEN  
MYTHOLOGY AND EVO-DEVO

TABLE OF CONTENTS: 1. *Imaginary beings and the rules of form*; 2. *The hundred eyes of Argos: Evo-Devo, evolutionary plasticity and historical constraints*; 3. *The wings of Pegasus: architectural constraints and morphospace*; 4. *Conclusions: from imaginary beings to fantastic beings*.

*Perhaps universal history  
is the history of a few metaphors.*  
J.L. Borges, *Pascal's Sphere*, 1952.

### 1. *Imaginary beings and the rules of form*

«It is the animal with the big tail, a tail many yards long and like a fox's brush. How I should like to get my hands on this tail sometime, but it is impossible, the animal is constantly moving about, the tail is constantly being flung this way and that. The animal resembles a kangaroo, but not as to the face, which is flat almost like a human face, and small and oval; only its teeth have any power of expression, whether they are concealed or bared» [Borges 1974, 17]. With these words Franz Kafka describes a bizarre creature that appeared in his dreams: a *hybrid* in which the perspicuous characters of morphologically and ethologically different animals – such as the fox and the kangaroo – are mixed to human somatic traits, recalling ancient mythological beings [Borghese 2009, 283].

Jorge Luis Borges accurately transcribes the words of the Prague writer in his *Book of Imaginary Beings* [Borges 1974], a manual of fantastic zoology written in collaboration with María Guerrero in 1957 and

inscribed in the literary tradition of medieval bestiaries. This anthology appears as «a handbook of the strange creatures conceived through time and space by the human imagination» [ivi, 12], a reasoned catalogue in which harpies, phoenix, satyrs and many other beings of Greco-Roman mythology are collected together with biblical figures (such as Behemot and Leviathan) and oriental mythical creatures (such as Humbaba, the legendary guardian of the Cedar Forest portrayed in the epic of Gilgamesh, or Zaratan, the huge sea turtle described in the early ninth century by the Muslim zoologist al-Yahiz). The structure of all those imaginary beings is peculiar and results «from improbable combinations of parts of different animal species, as in the hippogryph and the chimera» [Minelli 2015, 33].

Since ancient times, man has shown a genuine passion for the recombination of visual elements in unusual and extraordinary forms, a skill that was already noted by the French biologist François Jacob at the beginning of the article *Evolution and tinkering*. He noted that

some of the 16th-century books devoted to zoology and botany are illustrated by superb drawings of the various animals that populate the Earth. Certain contain detailed descriptions of such creatures as dogs with fish heads, men with chicken legs, or even women without heads. The notion of monsters that blend the characteristics of different species is not itself surprising: everyone has imagined or sketched such hybrids [Jacob 1977, 1161].

Hybrids. Crossings. Fantastic images that «embody a breaching of boundaries that at once fascinates and puzzles» [Minelli 2015, 34] and whose creative mechanism concerns the complex relationship between sensitivity, intellect, and imagination. This peculiar connection has been philosophically analyzed since ancient times [cfr. Ferraris 1996; Franzini & Mazzocut-Mis 1996, 235-247]; however, a more accurate analysis of their mutual relationship can be found in Kantian writings. It is not my intention here to examine the philosophical investigations which led Immanuel Kant to elaborate his theories; I just want to point out that the Königsberg philosopher conceives the imagination as a *faculty of mediation*, a faculty that comes into action whenever a representation is presented to the human mind through the only possible way for man,



that of sensitivity and space-time intuitions. In the *Critique of Pure Reason*, the imagination is defined as «the faculty for representing an object even without its presence in intuition» [Kant 1998, 256] and it is usually used in two different ways: this peculiar faculty can be used to *faithfully reproduce* real objects – allowing us, for example, to recall in our mind the representations of past events (imagination as memorial reproduction) – or to *produce images* not derived from experience [ivi, 257]. These latter are the result of a “fantastic montage”, an “assembly” which – as in the case of the mythological beings mentioned above – combines separate elements, creating formal novelties.

As Kant shows, «the imagination of Homo sapiens has no limits in the creation of fantastic shapes, in the recombination of experiential elements to create monsters, hybrids, wonderful creatures» [Mandrioli & Portera 2013, 267]; but, if the ancients admitted the existence of such imaginary crosses,<sup>1</sup> today we are fully aware that their existence is limited to the ontological domain of the “merely thinkable”. This happens not only because nobody on Earth has ever come across these bizarre animals, but also because the imaginary beings created by the human mind are often irreconcilable with physical and biological laws.

Thus, if the imaginary beings described by Borges seem to respect some construction rules shared by existing animals (they preserve, for example, bilateral symmetry or maintain the polarity between the front and the back of the body), however, they do not respect *other* biological regularities, constancies that must be ascribed to a small number of *architectural patterns*, some “sedimented-over-time schemes” which constitute the *memorial archive of nature*. In most cases human imagination created such imaginary beings by limiting itself in caricaturing some distinctive features of existing beings (lengthening, shortening or altering the dimensions of certain body parts) or inserting appendages (wings, additional limbs, fragments of other animals, etc.) in the basic body configuration; nevertheless, in both cases the formal laws of living beings are broken.

---

<sup>1</sup> Jacob states that «in the 16th century these creatures belonged, not to the world of fantasies, but to real world. Many people had seen them and described them in detail. The monsters walked alongside the familiar animals of everyday life. They were within the limits of the possible» [Jacob 1977, 1161].

«The unknown artist from whose hands the chimera of Arezzo was created», says in this regard the Italian biologist Alessandro Minelli, «certainly had no concern about the rejection problems that, as we well know today, would have led to the failure of these improbable transplants» [Bruni 2015]: this anonymous artist was not aware of the physical and biological mechanisms which regulate the construction of the “goat and snake part” of Chimera body, “grafted” by our imagination on a lion shape; equally he did not know why the addition of these appendices is impossible from a biological point of view.

In view of the above, the morphologist must ask himself what biologically distinguishes imaginary creatures from some existing animals which are only apparently fantastic. In the attempt to settle this question, we asked ourselves: «the domains of forms created by imagination and the domains of natural forms are completely separate from each other» [Mandrioli & Portera 2013, 270]? What differentiates the Hydra of Lerna, the Sphinx and the Centaur from the small South American Axolotl [Henderson 2013, 2-23], the Siamese twins, the hermaphrodite creatures, the two-headed mammals and the *Drosophila* born with a pair of legs instead of the antennae? And why do these existing creatures generate in us at the same time a feeling of wonder and dismay?<sup>2</sup>

To answer these questions, in this article I try to investigate the reasons for animal variability and to trace «the ways and limits of formal organization» [Wagner & Laubichler 2004, 97], keeping in mind that living form is a mobile structure, a «changeable and complex phenomenon subject to regular and monstrous transformations» [Mazzocut-Mis 1995, 17]. In fact, accordingly to Charles Darwin

The members of the same class, independently of their habits of life, resemble each other in the general plan of their organization. This resemblance is often expressed by the term “unity

---

<sup>2</sup> «From a certain point of view, the hermaphrodite is even more disturbing than a centaur or a mermaid», says Minelli. «These, in fact, obey the syntax of the body, namely the spatial and functional relationship between the different parts (head, trunk, limbs), as we know them in ourselves and in our fellow humans – a formal blueprint we take as a model when we try to decipher the morphology of other living beings, whether normal or monstrous» [Minelli 2015, 34].

of type”; or by saying that the several parts and organs in the different species of the class are homologous. The whole subject is included under the general name of Morphology. This is the most interesting department of natural history, and may be said to be its very soul. What can be more curious than that the hand of a man, formed for grasping, that of a mole for digging, the leg of the horse, the paddle of the porpoise, and the wing of the bat, should all be constructed on the same pattern, and should include similar bones, in the same relative positions? [Darwin 2008, 319]

In this passage of the *Origin of the species*, the father of evolutionism considers morphology as the *soul* of naturalistic research (although he did not make a significant contribution to the development of this biological discipline)<sup>3</sup> and he testifies that nature «always works with the same materials, and that she only engages in varying forms» because «she is subject to mandatory laws, which oblige her to always make the same elements appear, in the same issue, in the same circumstances and with the same connections» [Mazzocut-Mis 1995, 35]. To understand formal phenomena, therefore, we must deal with the plasticity of organic bodies and study the external and internal laws that regulate the emergence of new morphological events in Nature because – says the German poet Johann Wolfgang von Goethe, the father of modern morphology – «discovering the rules of the form» «is the key to all signs of Nature» [Goethe 2009, 115].

---

<sup>3</sup> The historian of science E.S. Russell states in this regard: «it is a remarkable fact that morphology took but a very little part in the formation of evolution-theory. When one remembers what powerful arguments for evolution can be drawn from such facts as the unity of plan and composition and the law of parallelism, one is astonished to find that it was not the morphologists at all who founded the theory of evolution» [Russell 1916, 213].

## 2. *The hundred eyes of Argos: Evo-Devo, evolutionary plasticity and historical constraints*

The concept of *plasticity* plays a central role in Darwin's essay: it adequately accounts for the evolutionary tendency of living beings because, as Friedrich Nietzsche states in a passage of his *Untimely Meditations*, it indicates «the capacity to develop out of oneself in one's own way, to transform and incorporate into oneself what is past and foreign, to heal wounds, to replace what has been lost, to recreate broken moulds» [Nietzsche 2007, 62]. The father of evolutionism uses the term “plastic” from the first pages of the *Origin of the species*. In the chapter entitled *Variation to the domestic state*, Darwin states that every animal body shows an intrinsic character of “openness” and “modifiability” and, therefore, «breeders habitually speak of an animal's organization as something quite plastic, which they can model almost as they please» [Darwin 2008, 26]. As we can see, the concept of plasticity allows him to articulate the relationship between the *variability* of individuals belonging to the same species and their subsequent *selection*, whether it natural (the struggle for survival) or artificial (controlled breeding practices); in fact, just the simple observation reveals a certain attitude of animals to *change their configurations in the attempt to adapt to the environment*. Therefore the term *plasticity* indicates the set of possible changes or, in other words, the structural laws which regulates all the “tolerable” morphological changes [Malabou 2010]. How is articulated the relationship between these structural laws and the natural selection process? Why is the possibility of varying almost infinite but not unlimited? What contributes to the delimitation of the domain of possibilities granted to the living being?

In the last century, the emergence of the Modern Synthesis – the theoretical orientation that, integrating Darwinian theory with the genetics of Gregor Mendel, can be considered the dominant paradigm in twentieth-century biological thought<sup>4</sup> – has favored the affirmation of

---

<sup>4</sup> «The “synthetic theory”, or the “modern synthetic theory” [...] derives from the title of a book written by the grandson of Darwin's most effective defender: *Evolution, The Modern Synthesis*, published by Julian Huxley in 1942» [Gould 2002, 503]. The term “synthesis” highlights the integration between the theory of evolution and other

an externalist interpretation of living beings [Newman 1995, 219-223] identifying in natural selection the only leading cause of evolution; in fact, as Fusco and Minelli point out, «in the context of the modern synthesis, the role of environment in organic evolution can be roughly summarized by the well-known phrase: ‘environment proposes, natural selection disposes’, which expresses the one-way relationship between environment and adaptation in orienting the direction of evolutionary change» [Fusco & Minelli 2010, 547].

Accordingly, the fundamental assumption of this theoretical movement is the idea that genes find direct expression in the *phenotype* (the set of all observable characteristics) and that the animal form is the visible manifestation of the *genotype*, that is, the genetic constitution of an individual [Müller & Newman 2003, 7]. The affirmation of this approach in the twentieth-century scientific debate has therefore contributed to relegate morphology – a discipline based on the observation and comparison of phenotypic forms – to a marginal role in biological studies [Cislighi 2008, 249]; however, echoing Darwin’s quotation, we can affirm that «the very mystery of life is revealed in a thousand forms, which make it manifest, and through which the intelligible can be recovered» [Mazzocut-Mis 1995, 112]: phenotypes «have autonomy that can trump that of the [genetic] programs they supposedly express» [Müller & Newman 2003, 6] and, nowadays, many biologists affirm that the approach taken by Modern Synthesis requires a “revision” and a greater opening towards the study of the external configurations of living beings.<sup>5</sup>

---

biological branches. In particular, the new Synthesis integrates the Darwinian Theory with genetics (the theory of heredity developed by Mendel), botany, systematics and paleontology. «Up to this point one could consider the MS as, in fact, a synthesis: from Fisher to Dobzhansky, it was a fusion of neo Darwinism and Mendelism achieved through the theory and practice of the new population-statistical genetics. The other major contributions, however, went beyond synthesis to actually adding new concepts to the neo-Darwinian edifice, and in some cases to even contradicting some of Darwin’s own positions» [Pigliucci & Müller 2010, 7].

<sup>5</sup> Cfr. Müller & Newman [2003, 3] in which the authors point out that «the appearance of specific, phenotypic elements of construction must not be taken as being caused by natural selection; selection can only work on what already exists». As a consequence, «current evolutionary theory can predict what will be maintained, but

The recent development of the *Evolutionary Developmental Biology* (or more simply *Evo-Devo Theory*) can be understood in this direction as fundamental step to a new *Extended Evolutionary Synthesis* [Pigliucci & Müller 2010]. Evo-Devo Theory is a branch of biology that brings together evolution and development and aims to discover the laws governing the birth, the growth and the morphological organization of living beings. Developmental biology was an ancient field of study but, placing the analysis of form at the core of its researches, it had not ample space in the context of the Modern Synthesis. Moreover, in the past the scientists had few technical tools to investigate animal development. Today, however, «we can open this black box and understand not only the *survival of the fittest*, as evolutionary biology suggests, but also the *arrival of the fittest*, that is, how it is possible to build, through development, the different phenotypes; once the latter are completed, they will then be screened for selection» [Bruni 2015]. We can even aesthetically observe this formal construction because, as the American biologist Sean B. Carroll suggests, «there is also a special grandeur in the view embryology and evolutionary developmental biology provide into the making of animal form and diversity. Part of it is visual, in that we can now see how the endless forms of different animals actually take shape» [Carroll 2005, 13].

The developmental biology research program can, therefore, be useful to provide answers to our questions: why some of the imaginary beings described by the pens of poets and writers could never have existed in nature? And why, on the other hand, do creatures whose composite body structure exceeds human imagination (like, for example, the platypus or the yeti crab [Henderson 2013, 354-365]) exist? Or again: why are some mythological creatures (such as the Cyclops) not in contrast with natural rules and could be the fantastic repurposing of existing animal?

In the early eighties, a group of scientists (including Christiane Nüsslein-Volhard and Eric F. Wieschaus) studied the mutations of the fruit fly (*Drosophila melanogaster*): it was noticed that, among the millions of larvae raised in the laboratory, some specimens had a pair of

---

not what will appear» [ivi, 7].

legs instead of the antennae and some others were equipped with an extra pair of wings. These specimens had nothing to envy the Greek Gorgons or the Persian Manticore. The researchers discovered that the appearance of these “monstrous flies” did not contradict the “rules of the form” and was due to the mutation of some specific genes which oversee the formation and the organization of morphological structures [Carroll 2005, 61-74]: the *Hox* genes (short for *Homeobox*) or *architect genes* [Caianiello 2006, 48]. These are *morphogens*, because their «information content is expressed in the entire construction of animal process» [Pievani 2006, xv] and their main function is to identify in the embryo the expression of other genes determining the development of different body structures.

The secret of “animal geometry” is therefore linked to these genes: they allow to activate or deactivate the “switches” that, during the formation of an organic process, determine the number of body parts, their shape, their position and their size.

Starting from these premises, in a few decades the *Evo-Devo* has produced a huge mass of experimental data which reveal an exciting result: it was possible to demonstrate the presence of a complex of genes (to be precise a sequence of 180 pairs) that organize for the development of body pattern: these genes are the same not only in the simpler bacteria and organisms but also in the famous *Drosophila melanogaster*, the fruit fly now considered an undisputed protagonist of animal genetics research. A question spontaneously arises: bacteria? Flies? What can these tiny life forms teach us about the morphological construction of human body and, more generally, of the mammal ones? And what information can they give us on the boundary between normal, pathological and imaginary development of forms?

«The common perception», writes Carroll, «reinforced by decades of zoology and a wide cultural divide between biologists who worked on mice, rats, or other conventional models of human biology, and those who worked on “lower” forms – was that the rules of physiology and development differed enormously between mammals and bugs or worms» [Carroll 2005, 63]. The evolutionary lines of these animals diverged more than 500 million years ago and the formal differences accumulated during the geological eras are so great that for decades it has been



considered “useless” to carry out speculations and experiments on these creatures in the attempt to understand something more about the genetic and morphological construction of higher animals.

Moreover, as the biologist Jonathan Slack points out with a metaphor of great impact, the discovery of the *homeobox* is comparable to that of the Rosetta stone which allowed us to decipher hieroglyphic writing by means of linguistic comparison [Slack 1984, 364]: despite the great differences in appearance and physiology, all complex animals (including humans) share a small number of regulatory genes (about ten). «If we think that the corporeal architectures of the entire animal kingdom depend on the same conductors who conduct the development dance in very different living beings such as an insect, a frog, a worm and a lion, it appears, in all its dazzling clarity, the matrix of biological and historical unity that embraces living creatures» [ivi, 13], a “common frame” which explains the origins of all morphological determination.

It was soon noticed, for example, that the *Distal-less gene* (involved in the development of the fruit fly limbs) has a counterpart in human DNA gene and that the same happened for other *Hox* genes, such as the *Tinman gene* that regulates the development of the circulatory system: all morphogens identified in the “insignificant” fruit fly have a human equivalent. But there is more: it was discovered that the *Eyeless gene* (so named because the mutant flies for this gene do not have eyes) has an equivalent in mammals in the so-called *Small Eye gene*, which corresponds, in turn, to the *Aniridia* human gene. The *Eyeless gene* was experimentally manipulated and it was shown that it could be activated in anomalous regions of the gnat’s body structure [Carroll 2005, 66]: eyes appeared on the wings and paws and, even more incredible, the same bizarre phenomenon also occurred when homologous genes of other species were introduced into the fly’s gene sequences, demonstrating the equivalence of these genes. In the light of these discoveries, the morphology of Argus, the Greek mythological creature with a hundred eyes, does not appear so bizarre and seems paradoxically to have anticipated the outcome of these experiments.

Furthermore, these discoveries led biologists to admit the existence of a common origin of living beings and to the formation of the concept of *zootype*, a term that indicates «the topographical scheme



according to which different organs would be distributed along the main axis of the body of all animals» [Minelli 2009, 45]. We are faced with a «shared body syntax» [Bruni 2015] which explains why each animal can be interpreted as a variation on the theme (represented by the so-called *historical development constraints*, i.e. constraints inherited from its ancestors) or as a different combination of the building blocks belonging to the same genetic box (each living being is «the result of a constructive path that has settled in evolution for different adaptive reasons but starting from the same basic ingredients» [Pievani 2006, xiii]).

### 3. *The wings of Pegasus: architectural constraints and morphospace*

Without questioning the truthfulness of these facts, we must ask ourselves if this approach is authentically explanatory towards form and its coming into being. The Evo-Devo Theory allows us «to abandon a version of evolutionary theory based only on genes and on the quantitative variations of allelic frequencies within populations. It adds forms to genes, recognizing that the mechanisms involved in the development of forms have the same importance of other already known mechanisms» [Mandrioli & Portera 2013, 274]; however, we are once again faced with a theoretical attitude that considers phenotype development as the “explicitation of an acronym” kept in the cell nucleus. The current state of research leads us to affirm that «there simply *aren't enough genes* to “determine” the phenotype» [Callebaut *et al.* 2007, 29] and therefore this theory “sins of excess” because, considering itself exhaustive towards formal development, it does not invoke the help of other emerging biological theories.

In fact, the constraints affecting the development process of organic forms will be of various types: genetic and ontogenetic, physical and historical. For example, the American biologist Stuart A. Newman does not consider the organisms as the simple expressions of their genome, but as a «carnal entity» [Newman 1995]: the animal form is the viewable result of a functional adaptation to the environment, but it is also influenced by physical forces that lies «“outside” (and prior to) the specific architectural blueprints of each particular *Bauplan*» [Gould 2002,

1181]. Only later, the «innovation linked to the phenotype and the development systems that guide its formation can be fixed as a result of a genetic “program”, giving rise to defined *Baupläne*» [Mandrioli & Portera 2013, 279].

The problems related to the animal form cannot be explained only tracing the phylogenetic chain of living being because the formal problems of these latter «are in the first instance mathematical problems, their problems of growth are essentially physical problems, and the morphologist is, *ipso facto*, a student of physical science» [Thompson 1942, 10]. Consequently, to understand the animal formal construction we need to analyze the “physical conditions” of our world which «imposes certain limitations on shapes and sizes of the various organisms» [Ceruti 2007, 6].

The Scottish morphologist D’Arcy Thompson underlines this aspect in his most famous work, the essay *On Growth and Form* [Thompson 1942]. He claims, for example, that the animal body shape is regulated by physical principles, such as the «Galileo’s principle of necessarily declining surface/volume ratios as geometrically similar objects increase in size» [Gould 2002, 1189]: accordingly to it animals are “sculpted” by natural forces in a different way because tiny animals must dwell «in a world dominated by forces acting upon their surfaces, while large animals will be ruled by gravitational forces operating upon volumes» [*ivi*, 1190].

From these premises it follows that, if only one of two imaginary animals exists in nature, the absence of the other is not necessarily attributable to natural selection; «rather, it may be that nature is not able to generate it, due to various types of constraints (genetic, ontogenetic, physical, structural, mechanical, functional, historical)» [Mandrioli & Portera 2013, 268]: in other words, the animal form is built respecting some *architectural constraints*;<sup>6</sup> some parameters

---

<sup>6</sup> The Italian term *vincolo* presents the Latin root *vincire* which indicates the act of binding, of chaining to something or someone, as still transpires today in the adjective of wide diffusion *avvincente* (compelling); although deriving from a different etymology, the English term *constraint* also conveys the same meaning, being attributable to a Latin verb *stringo* present in the Italian word *costringere* (to compel) [Gagliasso 2009, 183]. Different and perhaps more interesting, it is the German

or formal restrictions derived from the *generic properties* of organic matter.<sup>7</sup>

In the article *Why pigs don't have wings* [Fodor 2007], American philosopher and cognitive psychologist Jerry A. Fodor affirms that «nobody, not even the most ravening of adaptationists, would seek to explain the absence of winged pigs by claiming that, though there used to be some, the wings proved to be a liability so nature selected against them. Nobody expects to find fossils of a species of winged pig that has now gone extinct. Rather, pigs lack wings because there's no place on pigs to put them» [*ibid.*]. In this regard, Gould writes that «zebras could avoid feline predators by flying away, but even if genetic variation existed (as it almost surely does not!) for constructing a supernumerary pair of limbs in wing like form, zebras clearly exceed permissible weight limits under the venerable Galilean principle of declining surface to volume ratios in large creatures» [Gould 2002, 1029]. Pegasus, the most famous winged horse, would never have been able to fly to our planet, nor could he have accomplished the task assigned by Zeus to transport lightning strikes to Olympus, because he could not in any way free himself from the weight of gravity.

Therefore, the domain of imaginable things does not coincide with that of the possible ones and even less with that of the existing ones: nature is unable to accommodate all imaginable forms because, as Minelli well exemplifies,

---

term used to indicate this concept (*Bürde*) and widespread in the scientific field by the Austrian morphologist Rupert Riedl. The latter is a synonym of “load, burden, weight” and, as Salvatore Tedesco points out, it is closely linked to the responsibility [*Verantwortung*] of a character towards subsequent modifications [Tedesco 2010], since the probability that the latter undergoes modifications «depends on the number and the importance of functions and characters depending on it» [Wagner & Laubichler 2004, 98]. For a more in-depth analysis of the notion of terminological and conceptual constraints see Sarà 1998.

<sup>7</sup> The constraint is in fact defined by Gould as «coherent set of causal factors that can promote evolutionary change from a structuralist perspective different from – in the helpful sense of “in addition to” or “in conjunction with, and yielding interesting nonlinear conclusions in the amalgamation,” rather than “in opposition to” – the functionalist logic of Darwinian natural selection» [Gould 2002, 1026].

it is not sufficient to know the mesh size of a sieve to make forecasts about the characteristics of the flour or sand that will pass through it. It is also necessary to know what mix of materials we place in it. And one cannot tell whether in this material there are particles of all possible dimensions. [...] it is probable that some fraction of small particles that would have easily passed through the sieve, but which in actuality did not, is missing from this material because it was not present in the material to be sieved in the first place [Minelli 2009, 63].

#### 4. *Conclusions: from imaginary beings to fantastic beings*

At the beginning of this article, I asked myself: what makes the creatures imagined by poets at the same time dismay and marvel? What regularities has the human mind implicitly followed in creating them? And what constraints these imaginary creatures are not able to respect? In this analysis, I tried to trace the path that guided Evo-Devo scholars to identify the *genetic and historically constraints* of animal configurations. These “biological restriction” allows us to understand, on the one hand, why a mythological being like the Cyclops Polyphemus seems *intuitively more adequate* for us than Sirens, Satyrs and Centaurs; on the other hand, they help us to elucidate why nature admits the existence of “bizarre animals” (individuals with more appendages than normal or which presents body tissues in unusual sections). We have also highlighted the existence of some architectural constraints, i.e. limitations that can be attributed to the Physics of our world and are not “genetic sedimentations”. Harpies and Griffons could never fly in our world because their wings would not sustain their body mass; conversely, “unusual” and “bizarre” creatures (such as the platypus, the *Aye-Aye* of Madagascar or the *Marcidus Psychrolutes*) are possible in Nature because – as Minelli says – they pass through the “sieve” of reality [Minelli 2009, 63].

These reflections lead us to a paradoxical outcome: nature allows the existence of individuals whose formal configuration has nothing to envy the most famous mythological creatures. However, if this mor-

phological structure can be explained from a biological point of view, it is not equally clear why we instinctively experience a feeling, at the same time, of amazement and fear observing these creatures: why does a mutant fly intimidate us more than the description of Cerberus? Can aesthetic reflection be useful to find an answer to our questions by combining literary suggestions, scientific experiences and philosophical considerations?

In the work *Le Change Heidegger. Du Fantastique en Philosophie*, French thinker Catherine Malabou confronts the theme of *fantastic*, strongly influenced by the reflections of Roger Caillois in the essay *Au cœur du fantastique* [Caillois 2004].

To clarify the importance of this theoretical reference, it is first of all necessary to analyze the definition of the term “fantastic”. In his writing Caillois gives an unusual definition of this term: it does not indicate the “fruit of the imagination”, the “supernatural” or, more generally, something different from “the photographic reproduction of reality” (i.e. the unreal of fairy tales or the bizarre creatures of mythology); the fantastic is instead the “impossible that comes suddenly”, «break in the acknowledged order, an irruption of the inadmissible within the changeless everyday legality» [ivi, 152].

To mark the difference between the unreal fairytale and the shocking fantasy, Caillois distinguishes two literary genres dominated by imagination. The first one is the world of the *fantastic declared*: this is characterized by the deliberate invention of an alternative environment, with different laws from the terrestrial ones. In this world Pegasus, the Minotaur, Medusa and other famous literary creatures are *logically possible* and *not biologically in contrast* with the surrounding reality. In this context, warns the French thinker, it makes no sense to speak of something “unusual” or “extraordinary” because the exception is everywhere and indeed constitutes the rule. The second one, the fantasy that emerges “by leaps”, is perhaps more interesting: it derives from everyday life and not exceeds the laws of our world; however, it reveals a contradiction inherent in our existence and, for this reason, it is *sublime* (in the Kantian sense of the term) because at the same time it excites and frightens us. Even Tzvetan Todorov – one of the best-known theorists of the structuralist movement – agrees with this theoretical

perspective, addressing the defining problem of “fantastic” in a 1970 essay entitled *Introduction à la littérature fantastique*. In this work, the Bulgarian critic is ideally connected to Caillois and defines the fantastic as «the hesitation felt by a being who knows only natural laws, in the face of a supposedly supernatural event» [Todorov 1988, 28]. Therefore, for both authors, the fantastic is something “extraneous in the same”: it is the inexplicable that, precisely because of its being anchored to reality, arouses a feeling of uneasiness in us.

In our opinion, the “bizarre but natural” creatures described in this article are of this type: formal modifications which, however amazing, took place in a “customary universe” and these strange living forms testify that evolutionary biology «gives us a richer and more rewarding sense of the nature of existence than a view informed by myth and tradition alone» [Henderson 2013, XV].

## References

- Borges, J.L. [1974], *The Book of Imaginary Beings* (1957), trans. by N. Thomas, London, Penguin Books.
- Borghese, L. [2009], Kafka e gli animali, in: *Belfagor* 3, 271-289.
- Bruni, D. [2015], Conversazione con Alessandro Minelli. Il labirinto delle forme possibili, in: *APhEx. Portale Italiano di Filosofia analitica* 13. [http://www.aphex.it/public/file/Content20160129\\_APhEx13,2016\\_IntervisteMinelliBruni.pdf](http://www.aphex.it/public/file/Content20160129_APhEx13,2016_IntervisteMinelliBruni.pdf) (Accessed 2.4.2020).
- Caianiello, S. [2006], Il ritorno dell’embriologia. Per una storiografia inversa del rapporto tra sviluppo ed evoluzione, in: *Laboratorio dell’ISPF* III, 48-57.
- Caillois, R. [2004], *Nel cuore del fantastico*, trans. by L. Guarino, Milano, Abscondita.
- Callebaut, W., Müller G.B., Newman S.A. [2007], The organismic systems of approach: Evo-Devo and the streamlining of the naturalistic agenda, in: R. Sansom, R.N. Brandon (eds.), *Integrating Evolution and development*, Cambridge, Cambridge University Press, 25-92.

- Carroll, S.B. [2005], *Endless Forms Most Beautiful. The New Science of Evo-Devo and the Making of the Animal Kingdom*, New York, W.W. Norton & Company.
- Ceruti, M. [2007], La hybris dell'onniscienza e la sfida della complessità, in: G. Bocchi, M. Ceruti (eds.), *La sfida della complessità*, Milano, Mondadori, 1-24.
- Cislaghi, F. [2008], *Goethe e Darwin. La filosofia delle forme viventi*, Milano-Udine, Mimesis Edizioni.
- Darwin, C. [2008], *On the Origin of Species* (1859), trans. by G. Beer, Oxford, Oxford University Press.
- Ferraris, M. [1996], *L'immaginazione*, Bologna, Il Mulino.
- Fodor, J.A. [2007], Why pigs don't have wings, in: *London Review of Books* 29 (20). <https://www.lrb.co.uk/the-paper/v29/n20/jerry-fodor/why-pigs-don-t-have-wings> (Accessed 03.5.2020).
- Franzini, E., Mazzocut-Mis, M. [1996], *Estetica. I nomi, i concetti, le correnti*, Milano, Bruno Mondadori.
- Fusco, G., Minelli, A. [2010], Phenotypic plasticity in development and evolution: facts and concepts, in: *Phil. Trans. R. Soc. B* 365, 547-556.
- Gagliasso, E. [2009], Dal determinismo al vincolo. Transizioni epistemiche, in: M. Di Monte, M. Rotili (eds.), *Vincoli/Constraints (Sensibilia n. 2)*, Milano/Udine, Mimesis Edizioni, 173-198.
- Goethe, J.W. [2009], *Gli scritti scientifici. Morfologia III: Per una scienza del vivente*, ed. E. Ferrario, Bologna, Il Capitello del Sole.
- Gould, S.J. [2002], *The Structure of Evolutionary Theory*, Cambridge (MA), Harvard University Press.
- Henderson, C. [2013], *The Book of Barely Imagined Beings: A 21st Century Bestiary*, Chicago (IL), University of Chicago Press.
- Jacob, F. [1977], Evolution and tinkering, in: *Science* 4295, 1161-1166.
- Kant, I. [1998], *Critique of pure reason* (1781), ed. P. Guyer, A. W. Wood, Cambridge, Cambridge University Press.
- Malabou, C. [2004], *Le Change Heidegger. Du Fantastique en philosophie*, Paris, Édition Léo Scheer.



- Malabou, C. [2010], De l'équilibre plastique entre variation et sélection à son déséquilibre social, in: A. Prochiantz (ed.), *Darwin: 200 ans*, Paris, Odile Jacob.
- Mandrioli, M., Portera, M. [2013], La genesi delle forme biologiche. Creatività nei vincoli, in: A. Pinotti, S. Tedesco (eds.), *Estetica e scienze della vita. Morfologia, biologia teoretica, evo-devo*, Milano, Raffaello Cortina Editore, 267-288.
- Mazzocut-Mis, M. [1995], “*Gli enigmi della Forma*”. *Un'indagine morfologica tra biologia ed estetica a partire dal pensiero di D'Arcy W. Thompson*, Milano, Edizioni dell'Arco.
- Minelli, A. [2002], L'omologia rivisitata, in: *Systema naturae* 4, 209-253.
- Minelli, A. [2009], *Forms of Becoming: The Evolutionary Biology of Development* (2007), ed. and trans. M. Epstein, Princeton (New Jersey), Princeton University Press.
- Minelli, A. [2015], Challenged boundaries, in: *Rivista di estetica* 59, 32-43.
- Müller, G.B. [2003], Homology: The evolution of morphological organization, in: G.B. Müller, S.A. Newman (eds.), *Origination of Organismal Form. Beyond the Gene in Developmental and Evolutionary Biology*, Cambridge (MA)/London, The MIT Press, 51-69.
- Müller, G.B., Newman, S.A. [2003], Origination of organismal form: The forgotten cause in evolutionary theory, in: Eid. (eds.), *Origination of Organismal Form. Beyond the Gene in Developmental and Evolutionary Biology*, Cambridge (MA)/London, The MIT Press, 3-10.
- Newman, S.A. [1995], Carnal boundaries. The commingling of flesh in theory and practice, in: L. Birke, R. Hubbard (eds.), *Reinventing biology: respect for life and the creation of knowledge*, Bloomington (IN), Indiana University Press, 191-227.
- Nietzsche, F. [2007] On the uses and disadvantages of history for life, in: Id., *Untimely Meditations*, trans. by R.J. Hollingdale, Cambridge, Cambridge University Press, 57-123.
- Pievani, T. [2006], L'architettura della vita, in: S.B. Carroll, *Infinite forme bellissime. La nuova scienza dell'Evo-Devo*, ed. S. Boi, Torino, Codice Edizioni, xi-xvi.



- Pigliucci M., Müller G.B. [2010], Elements of an extended evolutionary synthesis, in: Eid. (eds), *Evolution. The Extended Synthesis*, Cambridge (MA)/London, The MIT Press.
- Poggi, S. [2008], *Il genio e l'unità della natura. La scienza della Germania romantica (1790-1830)*, Bologna, Il Mulino.
- Russell, E.S. [1916], *Form and Function. A Contribution to the History of Animal Morphology*, London, John Murray.
- Sarà, M. [1998], Nuove prospettive sul ruolo dei “vincoli” (constraints) nell’evoluzione, in: *Sistema Naturae* 1, 175-194.
- Slack, J. [1984], A Rosetta stone for pattern formation in animals?, in: *Nature* 310, 364-365.
- Tedesco, S. [2010], *Morfologia estetica. Alcune relazioni fra estetica e scienza naturale*, Palermo, Aesthetica Preprint.
- Thompson, D.W. [1942], *On Growth and form*, Cambridge, Cambridge University Press.
- Todorov, T. [1988], *La letteratura fantastica*, ed. E. Klersy Imberciadori, Milano, Garzanti.
- Wagner G.P., Laubichler M.D. [2004], Rupert Riedl and the re-synthesis of evolutionary and developmental biology: Body plans and evolvability, in: *Journal of Experimental Zoology. Part B, Molecular and Developmental Evolution* 302, 92-102.

### Key words

Morphology; Imaginary beings; Evo-Devo Theory; Constraints; Fantastic

### Abstract

Since ancient times, man has shown a genuine passion for the recombination of visual elements in unusual and extraordinary forms; but, if the ancients admitted the existence of mythological creatures, today we are fully aware that their existence is limited to the ontological domain of the “merely thinkable” because imaginary beings are irreconcilable with physical and biological laws. In this article I try to elucidate what differentiates from a morphological point of view the imaginary beings described by the pens of poets (such as Sphinx, mermaids and centaurs) from

bizarre but existing animals (i.e. the small South American Axolotl, the Yeti Crab, etc.) or from some specimens belonging to common animal species, but which present strange morphologies due to genetic errors. In dialogue with some positions of contemporary biology and literary criticism, I tried to investigate the rules of form to understand how historical and architectural constraints can influence the morphology of the living and why these existing creatures generate in us at the same time a feeling of wonder and dismay.

Valeria Maggiore  
PhD in Philosophy – University of Messina  
E-mail: [valeriamaggiore.vm@gmail.com](mailto:valeriamaggiore.vm@gmail.com)

## GREGORIO TENTI

THE LIVING DIFFERENCE.  
MORPHOLOGICAL ISSUES IN RUYER,  
SIMONDON AND DELEUZE

TABLE OF CONTENTS: 1. *Fortunes of the morphological idea*; 2. *Ecstatic and melodic temporality*; 3. *Topology of the affects*; 4. *Nature of the autós*.

1. *Fortunes of the morphological idea*

If we can discuss a subterranean morphological tradition in France, it is only by approximation. Following such a tradition means understanding a philosophical impulse, a grounding idea or intuition, that raises in Goethe's thought as the question of a specific kind of knowledge and stems from the necessity of understanding the living form before and beside its biological definition. This idea inspired a peculiar turn of the post-Kantian undertaking, insofar as the knowledge of the living form evokes the reunion of the conditions of experience with the causes of reality. Indeed, understanding a form means connecting to its specific becoming, to its *vivum*; and this cannot be accomplished other than by corroborating the continuous act of genesis, therefore by constituting oneself as a co-cause of uncodifiable results. The morphological sight is about participation in an act of inner vision, in incorporeal upheavals – as the “living” corresponds to an ideal dimension that belongs to the corporeal as both its rhythmicity and its effectuality: the «life of the essence» as the essence itself [Van Eynde 2005, 108]. More or less explicitly, all these solutions tend to a metaphysical view in which the Being is the concrescence of reality and knowledge takes form as – in Schelling's words – «the empiricism extended to unconditionality» [Moiso 1998, 75]. Here, the utopia of a «purely heterological knowledge» [Derrida 1967/1980, 189] corresponds to participation in nature's archetypal power. Of such magnitude is the legacy of *Goethezeit* [see for example Poggi 2000; Breidbach & Vercellone 2010].

It is interesting to notice how this philosophical enterprise reappears in original terms in the middle of the 20<sup>th</sup> century in France, as Merleau-Ponty, in *The Visible and the Invisible*, reflects upon a «Being» that is «*what requires creation for us to experience it*» [Merleau-Ponty 1964/1968, 197], Gilbert Simondon seeks the reunion of the «*condition of possibility of knowledge*» with the «*causes of existence*» [Simondon 2005, 257, my translation], and Deleuze, very similarly, tries to solve the «wrenching duality» between the «conditions of experience in general» and the «conditions of real experience» [Deleuze 1969/1990, 260] through a «superior empiricism» in which «the concept is identical to the thing» [Deleuze 2002/2003b, 43]. The spirit of those years is reflected in an atmosphere of renewed metaphysical assertiveness.<sup>1</sup> The rise of a post-critical paradigm reintroduces the idea of a living transcendental, be it Flesh or Nature as «wild Being and Logos» [Merleau-Ponty 1964/1968, 169], a principle of individuation as the trans-objective genesis of the Being (Simondon) or a process of becoming caught in its differentiation (Deleuze). Such perspectives aim at that «life of the essence» which is the form intended as its power of appearance, constituting the radicality and the unconditionality of experience: generativity as the only possible generality [see Barbaras & Milan 2001]. This great attempt has been recognized as the effort to make the morphogenetic order of nature transcendental [Malabou 2014/2016]. It remains inexplicable, especially in its surprising relations to the philosophical achievements of *Goethezeit*, if not traced back to two cores of thought, Henri Bergson's metaphysics of life and Georges Canguilhem's philosophy of the living, as two major historico-philosophical attractors.

Bergson's thought will be decisive for more than one of the following generations, even if as a heritage to repudiate [Bianco 2016]. Its in-

---

<sup>1</sup> Ruyer, Simondon and Deleuze can all be considered “post-critical metaphysicists”. The «*dogmatisme hypothétique*» proclaimed by Ruyer in his doctoral thesis [1930, 5] will evolve into a full-fledged mythological dogmatism. During a memorable discussion with Paul Ricoeur, Simondon [1960, 188] defines his philosophical perspective a «transobjectivism»; the first part of his work on individuation is indeed bluntly metaphysical. Deleuze revealed that in his youth he considered himself as the «most naïve» among his colleagues [1990/1995, 88] and he is now recognized unanimously as a 20<sup>th</sup>-century metaphysicist.

fluence is of utmost importance for what concerns our subject: Bergson was in fact the most important French philosopher of his time to take an interest in the problems of theoretical biology beyond Darwinism (mostly received through Spencer) and to come into contact with the German tradition in the field of *Lebensphilosophie*. *Creative Evolution* (1907) approaches the great flourishing of 19<sup>th</sup>-century German biology, through theories such as August Weismann's, Hans Driesch's, Theodor Eimer's, Johannes Reinke's; Bergson retrieves the French vitalist and life sciences tradition from the Montpellier School to Claude Bernard and inserts this large number of authors in a consistent – and later dominant – philosophical framework worthy of contemporary sciences. Bergson's philosophy comes to Haeckel in Jena, to Simmel in Berlin, to Driesch in Heidelberg and to Scheler in Göttingen, with numerous reciprocal influences [Zanfi 2013]. It can be stated, then, that Bergson receives, elaborates and dialogues with a tradition that had never severed ties with the biocentrism of the *Goethezeit* and with the vitalist tradition itself. Thanks to the importance of his reflection, Bergson will decisively contribute to revitalizing ancient problems under the aegis of the status of the living and of «integral experience»; although his successors will often point out his philosophical failures and hide the significance of his influence. It would be no historical inaccuracy to affirm that the 20<sup>th</sup>-century French philosophy of life takes as its springboard «the failure of Bergsonism» as much as his achievements [Barbaras 2008].<sup>2</sup>

Georges Canguilhem, instead, was the one philosopher to devote his research to the problems of the living and to vitalism «as a permanent exigency» [Canguilhem 1965/2008, 62]. Canguilhem's approach to Bergsonism can be divided in three different phases, as summarized well by Bianco [2013]. After a first rejection, not far from Merleau-Pon-

---

<sup>2</sup> From a theoretical viewpoint, this failure is linked with the “pureness” of Bergsonian vital principle, i.e. with the background spiritualism that leads him to subordinate the inorganic along with all the mechanical processes, and to emphasize an abstract idea of Life, originally deducted from consciousness. Simondon shares Canguilhem's aversion to Bergson as a philosopher of the «pure process», of the continuous flux, but he shows having read him carefully. Ruyer often takes divergent positions from Bergson, especially on the theme of perception. Only Deleuze will restore Bergsonian philosophy almost completely, though with considerable elaborations.

ty's and Sartre's criticisms, he deals more thoroughly with Bergson's philosophy during the 1940s and he finally defines his reading in two lectures of the 1960s, later gathered in *La vie et le concept*. In general, Canguilhem's attention to the living does not derive directly from Bergson, but allows him to restore Bergsonism in light of some common grounds.<sup>3</sup> His mediation holds the merit of shifting the focus from the Bergsonian metaphysics of life to the living singularity in itself. By focusing on the problem of the organism<sup>4</sup> and its specific *logos*, Canguilhem gives French historical epistemology a breakthrough towards «biological philosophy» as a philosophy of the living form, drawing directly – just like Merleau-Ponty<sup>5</sup> – from the morphological tradition (von Weizsäcker, Buytendijk, Goldstein, von Uexküll) and facing specific issues such as the conceptual status of the pathological, the physiological notion of reflex, or the concept of *milieu*. In Canguilhem's view, morphogenesis is recognized as the living's only norm, to which the formation of concepts itself must be traced back. Biological knowledge is such that «it is the *pathos* which conditions the *logos*» [Canguilhem 1966/1991, 222]; in general, as Foucault puts it, «forming concepts is one way of living, not of killing life» [Canguilhem 1966/1991, 21], since life is defined by its creative auto-normativity.

Once having linked Bergson's and Canguilhem's theories to some of their scientific references, it is easier to understand how the specu-

---

<sup>3</sup> One possible link between Canguilhem's research and the Bergsonian legacy – considered as relatively independent from Bergson's philosophy – could be recognized in the field of theoretical psychiatry, a not strictly philosophical area where Bergson's ideas exerted a deep and wide influence, in figures such as Pierre Janet, Eugène Minkowski, Constantin von Monakow and Raoul Morgue [see Babini 1990].

<sup>4</sup> Between the 1920s and the 1930s, organicism established itself as the leading paradigm in biology, overcoming the feud between vitalists and physicalists [Mayr 1997, 16-17]. One of the most relevant organicist scholars of the first half of the century, the neurologist Kurt Goldstein, was a major source of both Canguilhem and Merleau-Ponty.

<sup>5</sup> Merleau-Ponty's reflection, coeval to Canguilhem's, comes autonomously to a morphological (and specifically *naturphilosophisch*) comprehension, drawing directly from authors like von Weizsäcker, Buytendijk and Kurt Goldstein, and deals with Bergsonism as well. His interest for the living, however, remains inseparable from the phenomenological tradition and subordinated to it.

lative migration took place: authors like Driesch, von Weizsäcker, von Uexküll, Buytendijk and Goldstein (to name only the most important) are dense with echoes of a tradition that goes back to the age of Goethe throughout the history of life sciences. Hans Driesch above all had already carried out a profound work of reconstruction of such a tradition, starting from Stahl (and therefore from Leibniz) up to the «neo-vitalistic» conception of his time, passing through Wolff and Blumenbach, Kant and the nature-philosophers, the consolidation of physiology and the physicalist tradition [Driesch 1905]. The morphological idea, in this sense, corresponds to the survival of certain issues: the problem of living individuality, perfectly sketched by Driesch himself during his Gifford Lectures [1908] and the ensuing lessons at London University [1914]; the problem of what “living” is, whether a property, a force, or a structure, and the consequent problem of the duality between life in general and living singularity (seen as an organism or not); lastly, the relation between life and human knowledge, or the possibility of an *in actu* understanding that does not reduce its object to a collection of *data*, hence to the laws of identity and causality.<sup>6</sup> The actual subject of a philosophy of the living is a paradoxical and impossible one as such, as it is not objectual: it is the impersonal act in which the living consists, the act of generation or genesis, the morphogenetical *a priori*.<sup>7</sup>

These were the problems of Goethe, and of Kant in the *Kritik der Urteilskraft* and in the *Metaphysische Anfangsgründe der Naturwissenschaft*; then of an entire generation of scientists and philosophers. These problems formed the core of gestating German biology [Zammito 2018] and survived through both materialist and vitalist trends in theoretical biology, up to their elaboration in 19<sup>th</sup>-century philosophy. The condi-

---

<sup>6</sup> These three issues are easily recognizable as aspects of the same phenomenon. «A finite living being partakes of infinity, or rather, it has something infinite within itself» which ensures that it eludes the mereological inquiry [Goethe 1988, 8]. The epistemological consequence is that «a living thing cannot be measured by something external to itself» [*ibid.*]; the ontological consequence, instead, is that «no living thing is unitary in nature; every such thing is a plurality» [Goethe 1988, 64]: not a plurality of parts, but rather a plural whole, a manifold totality.

<sup>7</sup> Whence the most important statement of philosophical morphology: the substitution of the morphogenetical process of formation for the individual form, of *Gestaltung* for *Gestalt* [Goethe 1988, 63-64].

tions of knowledge were clearly adequate, in the France of the first half of the century, to produce such a fruitful resumption. Suffice it to look at the number of sources, both biological and philosophical, used by another thinker of the generation of Merleau-Ponty and Canguilhem – a much more isolated, but not less significant figure who orientated his research towards the problems of the living during the 1930s, Raymond Ruyer (1902-1987). The references made on the pages of *Néo-finalisme* [1952a] count works by Bertalanffy, Driesch, Waddington, Goldstein, von Uexküll and Darlington, studies devoted to animal mimicry, and wide-ranging theoretical works by French scholars.<sup>8</sup>

Ruyer is in all respects a solitary figure, who is only in present times receiving the attention that he deserves. Nonetheless, he played an active part in the philosophical elaboration of an epistemology of quantum physics (and in the peculiar vitalism that many quantum physicists, like Niels Bohr, were developing at the time); he was also one of the first philosophers to reflect upon the significance of cybernetics. After some first works of mechanist orientation, Ruyer built a metaphysics of life-forms becoming influenced by Whitehead and Samuel Alexander, especially in *Néo-finalisme* [1952a] and *La genèse des formes vivantes* [1958, 1967]; through an understanding of the life of matter and systems, he theorized in favor of a «true form» by facing one of deepest problems of morphology, that of auto-normativity. His initial theses benefited of an in-depth elaboration of the processes described by embryology, a real science guide until his last book, *L'embryogenèse du monde et le Dieu silencieux* (1983-87, published in 2013). Deleuze was a careful reader of Ruyer, from *Difference and Repetition* to the last pages of *What is philosophy?* [Deleuze & Guattari 1991/1994, 213], where Ruyer is declared the last representative of a vitalistic metaphysics of becoming and the only philosopher who understood the concept of form.

We can affirm that Deleuze (1925-1995) himself was a brilliant morphologist *malgré soi*. It has been established that Deleuze is in great debt to both Bergson's philosophy of life and to many coeval reflections on life sciences [see Pearson 1999]; he refuses the tradition-

---

<sup>8</sup> For example *L'autonomie de l'être vivant* by Louis Bounoure [1949], *Invention et finalité en biologie* by Lucien Cuénot [1941], *La science des monstres* by Étienne Wolff [1948] (Ruyer's companion in captivity during the war).



al concept of form and often criticizes Goethe, but faces most of the philosophical issues linked to the living, using many authors ascribable to the above-mentioned tradition (let us just name the re-elaboration of Dalcq's embryology and of August Weismann's Neo-Darwinism in *Difference and repetition*, the interpretation of von Uexküll's ethology and of Saint-Hilaire's transformism in *A Thousand Plateaus*, or the reconstruction of Leibniz's philosophy of nature in *The Fold*). Finally, he builds a greatly relevant theory of the living based on the concepts of genesis and affect.<sup>9</sup> The form, as has already been noted [Buydens 1990], ends up constituting a spectral presence in Deleuze's philosophy, whereas its actual enemy is organicist structuralism. A perspective centered on form as the ever-individuating, in any case, has never been contrary to the morphological assumption: in fact, the action and the status of the "force" as well as the inextricability of form and force have always been part of the problematic field revolving around the living [see Moiso 1999]. As regards the stress on speculative creativity and its power to trace back the conditions of reality by taking active part in them, Deleuze's «transcendental empiricism» can be seen as a real heir of Goethean empiricism (though under the auspices of Bergsonism).

Another essential source of Deleuze's philosophical fortune are the works of Gilbert Simondon (1924-1989), whose influence has been acknowledged since *Difference and Repetition*.<sup>10</sup> Only quite recently reappraised as an autonomous thinker, Simondon is author of a complete and original philosophy of the living, ingeniously extended to technical objects and becomings. Not unlike Ruyer, he sees in quantum physics and in cybernetics the chances for a new perspective on reality (but unlike Ruyer, with whom he enters discussions, he grants greater im-

---

<sup>9</sup> It is difficult to separate, from a certain point onwards, Deleuze's philosophy from Félix Guattari's contribution. However, there are numerous shifts of focus in the works written by Guattari alone in the same period: in *Chaosmosis* [1992], for example, genetic becoming is considered more from the perspective of production of subjectivity and of the chances of political resistance to codification, with greater interest in a redrafted systems theory.

<sup>10</sup> Simondon and Deleuze are practically the same age and they were both disciples of Georges Canguilhem, but Simondon came to write his most important work in 1958, whereas Deleuze wrote his first masterpiece (which is *Difference and Repetition*) ten years later, in 1968.

portance to the latter [see Bardin 2010/2015, 30-31]). His doctoral thesis on individuation (1958, entirely published only in 2005) presents a massive criticism of history of metaphysics, whose biggest unthought is the priority of relations upon structures: whence the sheer morphological project of substituting the notion of form with a concept of the living act of morphogenesis. From Simondon's relational metaphysics of individuation emerges the project of a new criticism – mindful of Bergson's notion of intuition – that will flourish in Deleuze's philosophy [see Sauvagnargues 2012; Alloa & Michalet 2017]. In the Simondonian masterpiece of 1958, *L'individuation à la lumière des notions de forme et information*, form is the concept to designate the constant *prise-de-forme* of the Being as creative and material semiosis without origin.

French «biophilosophy» [Gayon 2010] or «*philosophie biologique*» [Lecourt 2018]<sup>11</sup> stands out from a more general “philosophy of biology” due to its assertiveness, which could be mistaken for a naïve, pre-critical metaphysical gesture [see Wolfe & Wong 2015]. In fact, this school of thought participated in a larger effort towards what we have mentioned as «post-criticism». Nowadays an analogous trend is deepening the link between the never-ending overcoming of Kantian transcendentalism and the categories of the living, in authors such as Catherine Malabou, Renaud Barbaras, Pierre Montebello, Iain Hamilton Grant; so that we can observe the 1950s-1960s «*moment du vivant*» [Worms 2009] from the viewpoint of a similar one [Worms 2013; Arnaud & Worms 2016]. Ruyer's, Simondon's and Deleuze's speculations on the living assume ever greater significance then, not least in relation to current life sciences [DeLanda 2002; Marks 2006; Protevi 2006, 2012, 2013; Koutroufinis 2014]. We have tried to emphasize the thread linking this particular moment, which we are going to explore theoretically, to a more dispersed, yet specific tradition that we have placed under the name of “morphological idea”. A narrowing of the focus is motivated by the fact that even more than the idea of life, the one of form still raises a certain amount of interest, both in current philosophy and theoretical

---

<sup>11</sup> This category was used by Canguilhem [1957] in a review of Ruyer's book *Éléments de psychobiologie*, titled *Note sur la situation faite en France à la philosophie biologique*, but it has already appeared in the work of a most interesting philosopher of Bergson's time, *Éléments de philosophie biologique* by Félix Le Dantec [1907].

biology [see Vercellone & Tedesco 2020]. It would be utterly inaccurate to understand 20<sup>th</sup>-century French biophilosophy as merely derivative of the 19<sup>th</sup>-century German tradition, without considering the autonomy of French theory of life – let us just think of the Montpellier School (Bichat, Cabanis, Bordeu, Barthez), of French materialism (Maupertuis, Buffon, Diderot, and La Mettrie), and of such important figures as Louis Pasteur and Claude Bernard – and the long-standing and complex osmosis between the two traditions. Nonetheless, all the hopes of a newly found non-«biochauvinist» [Wolfe 2015] or «critic» [Worms 2018, 188] vitalism lie – this is our opinion – in the fortunes of an enriched, reformed morphology.

Many changes in today's life sciences lead one to reconsider the ban on vitalism, but as a back-up paradigm for the explanation of “the living” and its morphogenetic processes, beyond any temptation of bio-centrism, hypostatization, or spiritualization. The current “vital turn” encourages one to comprehend and privilege the strategies of the living as models of creative consistence; this very sense of the current trends can be traced back to French biophilosophy as a sort of renewed morphology. Morphology, in its widest sense, corresponds to the problem of the consistency of becoming, hence to the problem of genesis – even as regards those “structural” solutions that should have solved the age-old problem of living individuality, like cellular theory and organicism [Moiso 1999]. Beyond the simple study of configurations as opposed to the anatomical study of internal structures and to the physiological study of living functioning, philosophical morphology's traditional domain extends by vocation to a philosophy of genesis. The theoretical path of this article will focus on outlining this aspect through the biophilosophical thesis of Ruyer, Simondon and Deleuze. These authors hold the fundamental merits of correcting the hierarchical centrality of organism in light of the priority of processes over structures, and of liberating vitalism from spiritualist reductionism through a broadened materialism. The issues of temporality, spatiality, and individuality will be taken as frames of reasoning.

## 2. *Ecstatic and melodic temporality*

Biological time has usually been ignored by philosophy of science in favor of its physical notion [Bouton & Huneman 2017]. In a morphology understood as ontology of becoming, the temporal dimension of form is the first problem to address. The oxymoron of morphological development is that of a non-sequential situation in which the result does not linearly follow the starting conditions, in which a genesis therefore takes place by virtue of a difference; a situation that nonetheless composes a recognizable rhythm, a nonpunctual path, a regime of stylistic orientations. There is a question of temporal *punctum*, writes Viktor von Weizsäcker in *Gestalt und Zeit*, and a question of temporal rhythm. This is the very problem displayed by embryogenesis: life is capable of rebuilding itself and of increasing in information through nonlinear paths, regulating a creative composition according to a not-entirely programmed norm and a seemingly oriented process of expression, in which the program is one with its own inflection. It is difficult to define, thus, *when* a genesis takes place. Just like the rise of epigenetics paved the way for Romantic vitalism, the philosophical implications of modern embryology – opposed to the emerging field of molecular biology – provided a starting point for our set of authors' speculations.<sup>12</sup> Ruyer has specifically reflected upon the impossibility of reducing an embryo's development to mechanist causality. The kind of causality that he calls «*de proche en proche*», by contiguity and juxtaposition (and therefore essentially spatial), reduces any becoming to identifiable parts in order to connect them by means of linear causality, like objects moved by Newtonian laws of motion. This kind of mechanist explanation has never been sufficient for explaining genetical processes, which are based on a *conatus* recognizable only *post festum*.

Especially in *Néo-finalisme* [1952a] and *La genèse des formes vivantes* [1958], Ruyer describes the life of matter as intrinsically procesual: every existence is activity and every real entity, insofar as it is a «form», is «*forme-activité*» [Ruyer 1952a, 162]. The movement is not

---

<sup>12</sup> Karl von Baer, father of modern embryology, was indeed a disciple of Karl Friedrich Burdach, the one who tried to realize the Goethean project of morphology as an actual science. Von Baer maintained in many ways the morphological approach.

the property of a structure, it is instead constitutive of a structure. First comes the «sense», which is the spontaneous activity of forming, inherent to bodily structures as their non-psychological memory.<sup>13</sup> One must imagine «une sorte de mélodie mnémique, immédiatement inhérent au tissu vivant, combinant son action avec celle des régulateurs secondaires, et présidant au jeu des relais chimiques» [Ruyer 1952a, 46]. The genetical passage from one developmental stage to another is conceivable, then, through the concept of an immanent rhythm of matter, irreducible to a physical energy or to a single instant: like a melody, it corresponds to a whole domain, «un certain rythme prolongé d'activités» [Ruyer 1952a, 158-59], that belongs to a non-actual dimension of reality and keeps acting in every atom as a power of *liaison*. The mnemonic potentials must interact, on a material level, with physico-chemical affects, which operate as triggering signals of the theme and regulate its unfolding within the space-time (for instance through genes).<sup>14</sup> But the actual path has always to be improvised: the whole precedes the parts as their relational and directional regime without causing them in a proper sense, since it is not external to them. In fact, the theme does neither resemble nor precede its realizations, which means that the process of actualization has an axiological status: it is never only a functioning operation, but rather an invention (since the previous stage does not necessarily imply the following).<sup>15</sup>

The accent is put on the activity in itself as a presence of the form

---

<sup>13</sup> In *Difference and Repetition*, Deleuze decomposes Ruyerian memory in three passive syntheses (biological present, reminiscence, and creation), making Ruyer's theory less vague and more complex. Already since *Bergsonism*, Deleuze designates with the Ruyerian term of «reminiscence» the active and virtual nature of the past.

<sup>14</sup> Ruyer argues against molecular genetics as a computational paradigm incapable of explaining the developmental processes and a new kind of preformism. He instead considers the genes not as direct causes in the morphogenesis, rather as occasional vehicles, signals useful to guide the process, simple means, as much as embryological inductors. Similarly, Simondon [2005, 180-182] underlines the equal value or the coextensivity of *soma* and *germen* in the construction of the living and links morphogenesis to non-codifiable informative dynamics.

<sup>15</sup> «Le passage des potentiels dans un monde d'individus actualisateurs est une opération enrichissante, une nouveauté incessante, toujours un effort et parfois un drame. Ce n'est pas une vaine redite» [Ruyer 1952b, 418].

inherent to the structure, i.e. on its semantic status, its constitutive life. The temporal essence of things emanates from their non-temporal dimension. What is left unthought is the genetic event, that is when and where exactly life melds with matter. Albeit, as we have seen, it is wrong to start with such a duality (since matter is intrinsically alive, and life is material), one can conceive a specific point where the line bends: the moment of the force, the affect, the consistency of application of the flux. Such a genetical moment must be external to the series of points, as the unquantifiable source of quantification, neither discrete nor continuous but rather “ecstatic”. The affect corresponds to the ecstasy of matter made ideal.

This dualism of vertical instant and horizontal rhythm can be described well with the categories of Deleuzian philosophy. Deleuze retrieves the notion of melody from Ruyer,<sup>16</sup> generally associating it with the concept of rhythm. Deleuze distinguishes between a rhythm which is «a regular division of time, an isochronic recurrence of identical elements», and a rhythm where «tonic and intensive values [...] create distinctive points, privileged instants which always indicate a poly-rhythm» [Deleuze 1968/1994, 21]. The distinction is drawn between repetition as a measure of the identical and repetition as «difference without concept», that forms a landscape of heterogeneous singularities, accents, points of valence, zones of expression. As in Ruyer, rhythm is both a force and an idea that produces synchronic environments of variations.

Deleuzian singularities are indeed the germinal instantaneities that fabricate chronic time. In *The Logic of Sense*, Deleuze describes the platonic ἐξάιφνης as an extra-temporal threshold or gradient, a non-subsistent interval: singularity constitutes the evenemential limit of the pure and incorporeal affect separated from body. Its consistency

---

<sup>16</sup> «What is primary is the consistency of a refrain, a little tune, either in the form of a mnemonic melody that has no need to be inscribed locally in a center, or in the form of a vague motif with no need to be pulsated or stimulated» [Deleuze & Guattari 1980/1987, 332]. This is one of the passages where Deleuze refers explicitly to Ruyer. Analogous meanings of the concept can be found not only in Merleau-Ponty, who speaks of nature as a «melody that sings itself» [Ruyer 1952a, 217]; but also and foremost in Jakob von Uexküll, who first spoke of organic development as a melodic becoming, discovering «Nature as music» [Deleuze & Guattari 1980/1987, 314].

is of intensive nature: it is an effectivity rather than a physical reality. The problem of the affect – as in Spinoza and Nietzsche – is the problem of the existence of pure potency. A coherent vitalism must conceive the affect not from the viewpoint of an external observer, as action without being, but rather from the perspective of the affect itself, as being that is for itself and that does not “take action” [Deleuze & Guattari 1991/1994, 213]. Following this radical program, both Deleuze and Ruyer arrive at an absolutization of the sensation. A formation, thus, is not only when it affects a body, on the model of perception: the genetical affect is rather always for itself, it is auto-affection, eternal self-enjoyment. However, the opposite is also true: auto-affection is always a semantic pulsation, an event, as an «a priori form of time, which in each case fabricates different times» [Deleuze & Guattari 1980/1987, 349]. The idea of the movement is in every germinal point of the line, which is not individual, but singular, hence ubiquitous and diffused, and of the same nature as the whole; the point and the line cannot be abstracted, as they share a common ideal essence. Pulsation and rhythm represent two faces of the same *a priori* of time.

How do we “watch” a force, asks Deleuze, or how do we “listen” to a force [1981/2003a, 56]? We do not simply perceive its effects on dead matter: we enter the rhythm of its spontaneous organization, and we place ourselves at the level of the ideal material where it lives as pure sensation, shifting from vision to a sort of speculative tactility. The body, in fact, is of the same nature as the force. The question about the force, hence, is a question about generation of ideal materials. Every entity is, to different degrees, a prism of speed and interactions: it modulates, amplifies and conveys semantic information. The theory of entities as semantic machines, as well as the theory of the speed of matter, refers to Simondon’s masterpiece, *L’individuation à la lumière des notions de forme et d’information* [2005], whose influence is visible since *Difference and Repetition* [see Hui & Morelle 2017]; but it finds surprising analogies in much earlier monistic reflections on nature like that of Lorenz Oken (1779-1851) [Poggi 2000, 455-57]. According to the Spinozist doctrine of *A Thousand Plateaus*, nature is «a fixed plane, upon which things are distinguished from one another only by speed and slowness», and enters in ever different assemblages [Deleuze & Guat-



tari 1980/1987, 254]. Matter itself is intrinsically ideal and traversed by infinite grades of speed, which represent its heterogeneity. There are specific regimes of individuation or strata that may correspond, for example, to slowdowns needed for further accelerations, in order to reach new speeds on different directions. This is the case – among many others<sup>17</sup> – of the passage from the physical to the vital regime of individuation as described by Simondon. According to his theory, a biological becoming takes place when the physical ceases to repeat its periodical traits, following a sort of curving dynamic. The physical becoming slows down on its inchoative stages (neotenzation), which will be kept alive in the recursive dynamics of a non-periodical equilibrium [Simondon 2005, 152-53]. These variations in speed determine a full-fledged «conversion» of space-time, a radical variation in rhythm. The *a priori* of rhythmic and singular pulsation, thus, is also a matter of morphogenetical speed.

### 3. *Topology of the affects*

Deleuze, Simondon and Ruyer are all thinkers of space-time, for whom what applies to time applies also to space. The concept of «speed» sums up this chrono-topological complementarity. The lesson of embryogenesis itself can be drawn from both a temporal and a spatial dimension. It is a lesson on the manifestation of the novelty of life: the real novelty is what synthetically emerges from previous stages of the matter by no means of deduction or linear causality. From this perspective, synthesis, or the production of sense, takes place entirely within nature.<sup>18</sup> This genetical passage is realized through a differential relation, by a break of the similarity chain or a «symmetry-breaking». After Hermann Weyl's theories, symmetry is defined as an equality in the application of certain constructive rules (invariants) to figures; hence a symmetry-breaking

---

<sup>17</sup> Morphogenetic processes of heterochrony (e.g. paedomorphism, peramorphism...) and neoteny started to be conceptualized from the late nineteenth century.

<sup>18</sup> Analogous conclusions can be found in Samuel Alexander's *Space, Time and Deity* (1920) and in Alfred North Whitehead's *Process and Reality* (1929), both important references for Ruyer and Deleuze.



represents the creation of a new form, usually on an infinitesimal level. Forms, in this manner, are considered from the viewpoint of their event, not of some intrinsic properties that constitute an essence [DeLanda 2002, 18]. Whenever a morphogenesis occurs, a symmetry-breaking may be brought up: Simondon for instance extends the physical concept of «phase transition» to every event of individuation; Deleuze talks of ontological bifurcations since *Bergsonism* (1966), and later makes it a characteristic of the «rhizomatic» becoming of nature in *A Thousand Plateaus*; Ruyer argues that biological causation is not attributable to proper “causality”, since it is nonmetric, nonquantitative, nonlocalizable (what induces today’s research to speak of a case of «entanglement» [see Vecchi *et al.* 2019]).

«Strictly speaking, symmetry exists only between different poles or focal points of interiority» to which a force is always exterior [Deleuze & Guattari 1980/1987, 399]. Symmetry is a quality of the organism, which represents, in Deleuzian philosophy, the hierarchical structure of the Being; whereas the *anorganic* is the concept of Becoming in itself. The two volumes of *Capitalism and Schizophrenia* are a great hymn to the anorganic force and to its effects on bodies, but above all to the force as an effect *of* bodies, as their immaterial resonance [Deleuze 1969/1990, 70]; in other words, to the paradoxical coincidence of *soma* and *germen* in the intensive consistency of sense. The argument exposed in *The Logic of the Sense* represents the solution to a matter which Deleuze addresses from the first works on Nietzsche until the last courses on Foucault: the problem of forces (which is again, in a way, the problem of the living itself in its seminal form). Is the force that pertains to the living separated from physical matter, or does it consist only of its effects upon the otherwise dead matter (as Blumenbach and Kant thought of the *nisus formativus*)? Is the force all in the affect? And if not, *where* is it?

In the already mentioned last pages of *What is Philosophy?*, Deleuze gives the following (partial) answer: «Vitalism has always had two possible interpretations: that of an Idea that acts, but is not – that acts therefore only from the point of view of an external cerebral knowledge (from Kant to Claude Bernard); or that of a force that is but does not act – that is therefore a pure internal Awareness (from Leibniz to Ruyer).

If the second interpretation seems to us to be imperative, it is because the contraction that preserves is always in a state of detachment in relation to action or even to movement and appears as pure contemplation without knowledge» [Deleuze & Guattari 1991/1994, 213]. If such an “objective” vitalism is necessary, it is because Becoming is not a mere property attributable to a logically precedent structure. As we have seen, an immanentistic view of the force does not necessarily lead to stasis or ineffectiveness: in Ruyer, for example, the ideal performs and actualizes itself constitutively, being it a *genetical* force; likewise does the Deleuzian «virtual» (though with the due differences [see Bogue 2017]). We must therefore put the stress on «the act of ontogenesis» itself, instead of on the simple structures or on the pure operations. The act of ontogenesis is neither the action of a structure nor that of an immaterial subject: the mistake of old vitalism, states Ruyer [1952a, 223], is indeed conceiving the force as a macroscopic influence that moves and animates matter. The “life” of the living is to be found elsewhere.

Every morphogenesis takes place by a break of interiority, which means that it comes from “outside” the constituted structure: it is always «heterogenesis» [Deleuze & Guattari 1980/1987]. It affects the body; its consistency is one of application and of affection. But as we have already seen, affection has to be taken in itself, as preceding and composing the bodies, insofar as it is genetical. The Becoming owns a specific ontological status: the “force” is, but not in the same order of the Being. It «insists» [Deleuze 1969/1990] on the matter as its semantic dimension, as its effectuality, its variation, and its singularity. In *The Logic of Sense* it is described as a wind among the series, a «vapor» of the structures that corresponds to their pure relations: «it belongs to no height or depth, but rather to a surface effect, being inseparable from the surface which is its proper dimension» [Deleuze 1969/1990, 72]. It is also «neutral» and «impassible», beyond determination (of quantity, quality, mode, etc.). Life (or «sense») is genetic, but also sterile (not fecund, not directly productive); it has «eternal truth» but cannot «be distinguished from its temporal actualizations» [Deleuze 1969/1990, 100].<sup>19</sup> It does not belong to bodies as their property, it rather is their

---

<sup>19</sup> The ground principle, already fully formulated in *Difference and Repetition*, is that «the world [...] pre-exists its expressions. It is nevertheless true that it does not

effect of genetical consistency, which nonetheless comes before them.

The answer to the question on “where is the force” cannot be given from the viewpoint of the structure that defines an inside and an outside. The force is at the same time interior and exterior to macroscopic structures, being fundamentally «preindividual». The notion of preindividuality, coined by Simondon and repeatedly used by Deleuze, refers to the semantic and virtual thickness of the individual, which finds place in its folds, constituting its «associated *milieu*». As argued by Simondon, this kind of exteriority (Deleuze’s «*dehors*») is not located outside and all around a structural interiority like an *Umwelt*: it is instead ubiquitous and medial, much more similar to a fluid,<sup>20</sup> as in ancient vitalism (but again not comparable to a macroscopic force). Both Ruyer and Simondon, in fact, place the genetical force in the ontological regime of the sub-atomic level, showing great philosophical faith in the conquests of quantum physics [Leblois 2007]. Quantistic dynamics reveal that the condition of the Being is one of constant activity, and specifically a relational activity without synthesis [Simondon 2005, 111], that avoids both the physicalist and the vitalist approach (the essentialism of the structure and that of the pure flux, discontinuism and continuism). In the quantum realm lies the «potential», the power of heterogeneity which corresponds to the first and purest genetical events. On a quantic level, everything is – again – a matter of speed [Simondon 2005, 129], «since each intensive quantum in itself is difference» [Deleuze 2002/2003b, 87]. Nowadays, the hypothesis of the role of sub-atomic matter in the biological processes is far from being a fanciful conjecture [see Longo & Montévil 2014]: quantum mechanics show acausal physical processes that can be applied – just as Ruyer does – to explain consciousness [Penrose 1989] and to comprehend the action of mind over body [Kauffman 2010, 224-25].

We argue that this perspective on the quantic status of the virtual (or potential) preindividuality should be thought of in continuity with

---

*exist* apart from that which expresses it [...]; but these expressions refer to the expressed as though to the *requisite* of their constitution» [Deleuze 1968/1994, 47-48].

<sup>20</sup> Canguilhem [1965/2008, 98-120] traces back the origin of the notion of *milieu* to the modern physics of fluids, also used to describe the medium *par excellence*, luminiferous ether.

Deleuze's topological approach to the infinitely small «matter-fold» as «matter-time» in the pages of *The Fold* [1988/1993, 7]. Deleuze had already noticed the relevance of organic “folding” in *A Thousand Plateaus*, where he evokes a puppet theater composed by Cuvier, Geoffroy Saint-Hilaire, von Baer, and Vialleton [Deleuze & Guattari 1980/1987, 46]. Through Leibniz's philosophy of nature, and later in *What is Philosophy?* and in the courses dedicated to Foucault, Deleuze develops a speculative topology of the living centered on the idea of completely virtual sets of relational modes that drive fluxes and influence the structures. While current topology looks for universal principles to be applied also in the field of the living from the viewpoint of transcendental schematics [Boi 2005], the topological law set out by Deleuze is one of transversal change and differentiation: that of «folding» and unfolding, involution and evolution. Development does not simply go from undifferentiated to more differentiated, it does not necessarily represent a growth in complexity; the ubiquity of germinal fields is the contemporaneity of the primordial Egg [Deleuze & Guattari 1980/1987, 164], which is far from constituting an original and primal stage. Between the macroscopic folds and below perception, there are other folds (not particles) of which material bodies are «zones of expression» [Deleuze 1988/1993, 98].<sup>21</sup> Singularities consist in this very activity of matter, this constant bending of constraints:<sup>22</sup> life is matter that folds.<sup>23</sup> This incessant bending is what Simondon describes as topological information, insofar as «*les vraies formes implicites ne sont pas géométriques, mais topologiques*» [Simondon 2005, 53].

---

<sup>21</sup> Deleuze comes to the same conclusions as Ruyer and Simondon: the processes of forming «do not apply to living organisms, but to physical and chemical particles, to molecules, atoms, and photons» [Deleuze 1988/1993, 103].

<sup>22</sup> From a topological perspective, elements are defined by their sense in a pre-extensive space of effects, comparable to a vector field in which invariants are topological accidents [DeLanda 2002, 72].

<sup>23</sup> Matter, in other words, is made plastic by the forces that inhabit it. The continuity between variation of constraints and apparition of novelty is explainable by underlining the role of the expressive processes, the moment of material passage of information. The concept of expression is, in fact, what allows Deleuze to take up Spinoza's monism. On the role of material expression in current life sciences and its philosophical relevance see for example Tedesco [2012], Mandrioli & Portera [2013].

#### 4. *Nature of the autós*

A large part of Ruyer's thought is devoted to grasping the concept of «true form». Deleuze, as we have seen, follows the same program, albeit with different adversaries. Deleuze argues against the central, interior and organic form, which is rooted in the transcendence of the Idea and which he associates with historical morphology: Goethe «passes for a Spinozist» when allied to Geoffroy Saint-Hilaire, but he «retains the twofold idea of development of form and a formation-education of the Subject» [Deleuze & Guattari 1980/1987, 542, note 52]. The Goethean form, in Deleuze's view, is still too subjective. A similar criticism towards organicism belongs also to Ruyer [1940a, 1940b], though Ruyer has opposed himself more to the mechanistic tendencies in contemporary sciences than to the organicist ones. As for Simondon, he admits that Goethean metamorphosis of plants is the model of his own concept of morphogenesis [2005, 517, note 37], but he also affirms that Goethe takes interest in Saint-Hilaire's transformism just to make it a system of classification [2005, 500, note 34], and that he does not clearly define the relation between individual and nature [2005, 503, note 35].

We can state that despite a general phase of coldness towards Goethean philosophy, the problems of Goethe were to a significant extent the same problems of French biophilosophers. From a very different starting point, most of Simondon's efforts, for example, are directed to demonstrating the priority of formation on form and of individuation on the individual already affirmed by Goethe. «*Qu'est-ce qu'un individu?*», asks Simondon: «*À cette question, nous répondrons qu'on ne peut pas, en toute rigueur, parler d'individu, mais d'individuation*» [Simondon 2005, 190]. «*L'individu n'est à proprement parler en relation ni avec lui-même ni avec d'autres réalités; il est l'être de la relation, et non pas être en relation, car la relation est opération intense, centre actif*» [Simondon 2005, 63]. The mistake of Aristotelianism is to place a proto-structure as substrate of every operation, hence to understand relations on the basis of their terms (and development, for example, on the basis of the formed adult). The priority of act over potency is at the origin of subjectivism and of the obsessive search for identity that

characterizes the scientific enterprise of modernity.<sup>24</sup> The fixed and stable structure is no less than a moment abstracted from a much more complex condition, in which certain regimes of formation influence the acts that take place in them. A chaotic state, as Simondon often notes, is much more “stable” than an ordered one: order does not go along with stability, but with dynamic tension, with living equilibrium of processes. Moreover, the concept of order is – as demonstrated by physics – relative to scale and size. Perceptive constancies are abstractions that cannot provide morphological norms for the natural becoming.

What is analogous throughout the whole of nature is instead a principle of information, morphogenesis, and active relation. The *principle of individuation* does not lie in a proto-structure, nor in an abstract flux or substantial becoming (as in ancient vitalism), but rather in the concrete act of manifestation, which is a «complete system» of synergies, with structural and energetic conditions. The individual exists insofar as he transmits, amplifies, articulates sense: by every act of propagation of sense, it individuates itself. «*L’individualité est un aspect de la génération*» [Simondon 2005, 190]. Individual equilibrium is a case of ever-acting tendencies, at the intersection between many rhythms or «phases» of individuation.

The fact that there is no such thing as the isolated individual does not deny the singularity of particular individuations. Simondon points out that every process has «*un terme non probabilitaire*» [Simondon 2005, 549], something beyond quantity (for example the number of signals) and quality (the semantic structures) that justifies the apparition of novelty; but he still binds this character of «intensity» to the presence of a perceptive subject, without substantially overcoming the Bergsonian view of *Les données immédiates* [Simondon 2005, 238]. Deleuze will be the one to decidedly turn the notion of intensity into an ontological concept. If morphogenesis is an act of concrete expression of novelty rather than a simple communication of signals, if it stems from a «real potential» rather than from logical possibility or representation, then it must correspond to a field of affections even without involving an

---

<sup>24</sup> As Ruyer puts it, the description of structures is the “easy part” of morphology and of classic science in general, while the study of genesis is the most complex and mysterious [Ruyer 1958, 5-6].

individual; insofar as it entails a difference (or a real transmission of information), it must have intensive nature even without depending on a psychological subject. Intensity is, for Deleuze, the concept of creative difference, inseparable from the affect, the zone where the force composes its structure and therefore consists. Every grade of affection establishes thresholds, valences, and orientations, reconfigures a system of meaning by virtue of a pure change, a non-identical condition, a posture. Objectivity and subjectivity are constituted after the act itself. Singularity is this ontological «inflection», this «axiomatic» (or genetic) novelty [Deleuze & Guattari 1991/1994, 91]. The same idea of orientation or inflection can be found in Simondon's «axiontology»<sup>25</sup> and in Ruyer's understanding of finalism.

«Consistency necessarily occurs between heterogeneities», and it is a matter of expression [Deleuze & Guattari 1980/1987, 330]. A multitude holds together not by repeating a hierarchical order, but through a genetic *nomos* regulated through a memory of matter. «The forms do not preexist the population, they are more like statistical results», writes Deleuze. «The more a population assumes divergent forms, the more its multiplicity divides into multiplicities of different nature, the more its elements form distinct compounds of matters». Moreover, «the degrees are not degrees of preexistent development [...]. Degrees are no longer measured in terms of increasing perfection or a differentiation and increase in the complexity of the parts, but in terms of differential relations and coefficients» [Deleuze & Guattari 1980/1987, 48]. Once having dismissed the structural standpoint, it is easier to see the flaws of every perspective centered on the conservation of the living individual rather than on its formation. Autopoiesis, for example, is a notion of clear physiological origin that implies the exteriority of the environment and subordinates processes to the constitution of the *autòs* by means of reflection; that reveals, finally, all the ambiguous political implications of system theories [Protevi 2009]. The morphological interrogation of that *omnitudo* which is also a *multitudo*, that *unitas multiplex* which cannot be thought according to the absolute metaphor of

---

<sup>25</sup> Deleuze acknowledges Simondon's influence on this point, but writes that he doesn't carry the notion of difference all the way through [Deleuze 1968/1994, 318, note 25].



organism, points towards the notion of a «perfect individuality lacking nothing, even though this individuality is different from that of a thing or a subject» [Deleuze & Guattari 1980/1987, 261], «singular without being individual» [Deleuze 2002/2003b, 87].

Thus, the “self” of the processes typically attributed to the form (self-organization, self-realization, self-design...) becomes problematic. From the viewpoint of genesis itself, we can conceive only «self-enjoyment», not after the model of spiritual reflection but after the one of natural *praxis*, of internal action. As Ruyer intends it, self-enjoyment is a primary activity that possesses itself, being in every part of itself: like the Goethean *Urpflanze*, the form «enjoys» its own transformation, its virtual entirety, perpetually [Moiso 2005, 294]. What is «enjoyed», therefore, is an infinite affection, which is an infinite (and simultaneous) generation. This is the only alternative – also according to Deleuze – to understanding genesis on the model of a representative process, with “someone” who generates or perceives the generation and something which is generated. When the affection or the transformation is untied from a subject and an object, the affect coincides with the space-time-less becoming of the being.

Instead of a celestial Hyperuranion, we could think of an infinite and non-subjective speculative dimension like the «Infinite Fun Space» that, in the fictional universe of Iain M. Banks, is the unsuspected dream of the mind-machines when left alone; or again to the quantic domain. What is crucial is that such an infinite ideality is not previsional (like a *mathesis universalis*), but is immediately creating. This is why Ruyer comes to a panpsychist conception, in which every form is active insofar as it exists and follows virtual paths without psychological deliberation: what is traditionally called “spirit” corresponds here to the virtual and differential thickness of living entities, the equipotentiality of the embryo and of the brain, the rhythms of the organs, the patterns in animal behavior, as well as any becoming in nature. The characteristic of equipotentiality shared by the embryo and by the human brain is the most vivid representation of the ecstatic state of matter: «*la norme spirituelle se transforme en “tâche” psychique; cette tâche à son tour tend à se transformer en liaisons physiologiques matérielles fonctionnant d’une manière automatique*» [Ruyer 1952a, 124]. A spiritual principle is not



distinguishable from nature itself [Simondon 2016, 34] as the «*pouvoir d'hétérogénéité*» of the Being [Simondon 2005, 358].

In the case of the living, the «form» is inseparable from the «formation». A living being is never entirely configured, and it can never limit itself to functioning: it forms itself incessantly. Since every formation is inseparable from a norm, we must say that the form is what gives itself its own norm in the act of existing [Ruyer 1952a, 157]. Forms, unlike figures and structures (which are mere aggregates), require a supplementary dimension to be understood [Deleuze 1988/1993, 102], that is what Kant recognized as their ideal nature,<sup>26</sup> since it refers to nonlocalizable relations instead of horizontal, causal, mechanically understandable linkages. As such, the form's ideality does not resemble a “glue” for the otherwise separated parts, because that would generate the *regressus in infinitum* that has been typical of an animist conception of life as macroscopic force (what is *between* the glue and the glued?). «We are contemplations», writes Deleuze [1968/1994, 74], insofar as we live.

## References

- Alloa, E., Michalet, J. [2017], Differences in becoming. Gilles Deleuze and Gilbert Simondon on individuation, in: *Philosophy Today* 61 (3), 475-502.
- Arnaud, F., Worms, F. (eds.) [2016], *Le moment du vivant*, Paris, Puf.

---

<sup>26</sup> «An idea must, it is thought, underlie the possibility of the natural product. But this idea is an absolute unity of representation, whereas the material is a plurality of things that of itself can afford no definite unity of composition. Hence, if that unity of the idea is actually to serve as the *a priori* determining ground of a natural law of the causality of such a form of the composite, the end of nature must be made to extend to *everything* contained in his product. For if once we lift such an effect out of the sphere of the blind mechanism of nature and relate it *as a whole* to a supersensible ground of determination, we must then estimate it out and out on this principle. We have no reason for assuming the form of such a thing to be still partly dependent on blind mechanism, for with such confusion of heterogeneous principles every reliable rule for judging things would disappear» [Kant 1790/2007, 205].

- Babini, V.P. [1990], *La vita come invenzione. Motivi bergsoniani in psichiatria*, Bologna, Il Mulino.
- Barbaras, R. [2008], *Introduction à une phénoménologie de la vie*, Paris, Vrin.
- Barbaras, R., Milan, P. [2001], Merleau-Ponty and nature, in: *Research in Phenomenology* 31, 22-38.
- Bardin, A. [2015], *Epistemological and Political Philosophy in Gilbert Simondon. Individuation, Technics, Social Systems*, Dordrecht/Heidelberg/New York/London, Springer. (Original work published 2010).
- Bergson, H. [1907], *L'Évolution créatrice*, ed. A. François, Paris, Presses Universitaires de France.
- Bianco, G. [2013], The Origins of Georges Canguilhem's 'Vitalism': Against the Anthropology of Irritation, in: S. Normandin, C.T. Wolfe (eds.), *Vitalism and the Scientific Image in Post-Enlightenment Life Science, 1800-2010*, Dordrecht/Heidelberg/New York/London, Springer, 243-267.
- Bianco, G. [2016], *Après Bergson. Portrait de group avec philosophe*, Paris, Presses Universitaires de France.
- Bogue, R. [2017], The force that is but does not act: Ruyer, Leibniz and Deleuze, in: *Deleuze Studies* 11 (4), 518-537.
- Boi, L. [2005], Topological knots models in physics and biology. Mathematical ideas for explaining inanimate and living matter, in: Id. (ed.), *Geometries of Nature, Living Systems and Human Condition. New Interaction of Mathematics with Natural Sciences and Humanities*, Singapore, World Scientific, 203-278.
- Bounoure, L. [1949], *L'Autonomie de l'être vivant: essai sur le formes organiques et psychologiques de l'activité vitale*, Paris, Presses Universitaires de France.
- Bouton, C., Huneman, P. [2017], Time between metaphysics and natural sciences: from physics to biology, in: Id. (eds.), *Time of Nature and the Nature of Time*, Boston, Springer, 1-20.
- Breidbach, O., Vercellone, F. [2010], *Pensare per immagini. Tra scienza e arte*, Milano/Torino, Bruno Mondadori.

- Buydens, M. [1990], *Sahara. L'esthétique de Gilles Deleuze*, Paris, Vrin.
- Canguilhem, G. [1957], Note sur la situation faite en France à la philosophie biologique, in: *Revue de métaphysique e de morale* 52 (2), 322-332.
- Canguilhem, G. [1991], *The Normal and the Pathological*, trans. by C.R. Fawcett and R.S. Cohen, New York, Zone Books. (Original work published 1966).
- Canguilhem, G. [2008], *Knowledge of Life*, trans. by S. Geroulanos and D. Ginsburg, ed. by P. Marrati and T. Meyers, New York, Fordham University Press. (Original work published 1965).
- Cuénot, L. [1941], *Invention et finalité en biologie*, Paris, Flammarion.
- DeLanda, M. [2002], *Intensive Science and Virtual Philosophy*, London/New York, Continuum.
- Deleuze, G. [1990], *The Logic of Sense*, trans. by M. Lester, ed. by C.V. Boundas, London, The Athlone Press. (Original work published 1969).
- Deleuze, G. [1993], *The Fold. Leibniz and the Baroque*, trans. by T. Conley, London, The Athlone Press. (Original work published 1988).
- Deleuze, G. [1994], *Difference and Repetition*, trans. by P. Patton, New York, Columbia University Press. (Original work published 1968).
- Deleuze, G. [1995], *Negotiations, 1972-1990*, New York, Columbia University Press. (Original work published 1990).
- Deleuze, G. [2003a], *Francis Bacon. The Logic of Sensation*, trans. by D.W. Smith, London/New York, Continuum. (Original work published 1981).
- Deleuze, G. [2003b], *Desert Islands and Other Texts. 1953-1974*, Cambridge (MA)/London, The MIT Press. (Original work published 2002).
- Deleuze, G., Guattari, F. [1987], *A Thousand Plateaus. Capitalism and Schizophrenia*, trans. by B. Massumi, Minneapolis/London, University of Minnesota Press. (Original work published 1980).
- Deleuze, G., Guattari, F. [1994], *What Is Philosophy?*, trans. by H. Tomlinson and G. Burchell, New York, Columbia University Press. (Original work published 1991).

- Derrida, J. [1980], *Writing and Difference*, trans. by A. Bass, London/ New York, Routledge. (Original work published 1967).
- Driesch, H. [1905], *Der Vitalismus als Geschichte und als Lehre*, Leipzig, Verlag von Johann Ambrosius Barth.
- Driesch, H. [1908], *The Science and Philosophy of the Organism. The Gifford Lectures Delivered Before the University of Aberdeen In the Year 1907*, London, Adam and Charles Black.
- Driesch, H. [1914], *The Problem of Individuality. A Course of Four Lectures Delivered Before the University of London In October 1913*, London, MacMillan & Co.
- Gayon, J. [2010], *Vitalisme et philosophie de la biologie*, in: *Repha 2*, 7-18.
- Goethe, J.W.von [1988], *Scientific Studies*, ed. and trans. D. Miller, New York, Suhrkamp.
- Guattari, F. [1992], *Chaosmose*, Paris, Galilée.
- Hui, Y., Morelle, L. [2017], A politics of intensity: some aspects of acceleration in Simondon and Deleuze, in: *Deleuze Studies* 11 (4), 498-517.
- Kant, I. [2007], *Critique of Judgement*, trans. by J.C. Meredith, ed. by N. Walker, Oxford, Oxford University Press. (Original work published 1790).
- Kauffman, S.A. [2010], *Reinventing the Sacred. A New View of Science, Reason, and Religion*, New York, Basic Books.
- Koutroufinis, S.A. (ed.) [2014], *Life and Process. Towards a New Biophilosophy*, Berlin/Boston, De Gruyter.
- Le Dantec, F. [1907], *Éléments de philosophie biologique*, Paris, Alcan.
- Leblois, H. [2007], Ruyer et la physique quantique ou «le cadeau royal de la physique contemporaine à la philosophie», in: *Les Études Philosophiques* 1, 39-62.
- Lecourt, D. [2018], *La philosophie des sciences*, 2<sup>nd</sup> edition, Paris, Presses Universitaires de France.
- Longo, G., Montévil, M. [2014], *Perspectives on Organisms. Biological Time, Symmetries and Singularities*, Berlin/New York, Springer.

- Malabou, C. [2016], *Before Tomorrow. Epigenesis and Rationality*, trans. by C. Shread, Cambridge, Polity Press. (Original work published 2014).
- Mandrioli, M., Portera, M. [2013], La genesi delle forme biologiche. Creatività nei vincoli, in: A. Pinotti, S. Tedesco (eds.), *Estetica e scienze della vita*, Milano, Raffaello Cortina, 267-288.
- Marks, J. [2006], Molecular biology in the work of Deleuze and Guattari, in: *Paragraph 29* (2), 81-97.
- Mayr, E. [1997], *This Is Biology. The Science of the Living World*, Cambridge (MA)/London, The Belknap Press of Harvard University Press.
- Merleau-Ponty, M. [1968], *The Visible and the Invisible. Followed by Working Notes*, trans. by A. Lingis, Evanston, Northwestern University Press. (Original work published 1964).
- Moiso, F. [1998], Individuo e ambiente. L'eredità del Romanticismo, in: P. Giacomoni, W. Müller-Funk, G. Frigo, *Pensare la natura. Dal Romanticismo all'ecologia*, Milano, Guerini, 63-89.
- Moiso, F. [1999], Nature and individuality, in: *Analecta Husserliana* 60, 23-42.
- Moiso, F. [2005], La percezione del fenomeno originario e la sua descrizione, in: G. Frigo, R. Simili, F. Vercellone, D. von Engelhardt (eds.), *Arte, scienza e natura in Goethe*, Torino, Trauben, 293-310.
- Pearson, A.K. [1999], *Germinal Life. Difference and Repetition of Deleuze*, London, Routledge.
- Penrose, R. [1989], *The Emperor's New Mind. Concerning Computers, Minds, and the Law of Physics*, Oxford, Oxford University Press.
- Poggi, S. [2000], *Il genio e l'unità della natura. La scienza della Germania romantica (1790-1830)*, Bologna, Il Mulino.
- Protevi, J. [2006], Deleuze, Guattari and emergence, in: *Paragraph 29* (2), 19-39.
- Protevi, J. [2009], Beyond autopoiesis: inflections of emergence and politics in Francisco Varela, in: B. Clarke, M. Hansen (eds.), *Emergence and Embodiment. New Essays on Second-Order Systems Theory*, Durham, Duke University Press, 94-112.

- Protevi, J. [2012], Deleuze and life, in D.W. Smith, H. Somers-Hall (eds.), *The Cambridge Companion to Deleuze*, New York, Cambridge University Press, 239-264.
- Protevi, J. [2013], *Life, War, Earth. Deleuze and the Sciences*, Minneapolis/London, University of Minnesota Press.
- Ruyer, R. [1930], *Esquisse d'une philosophie de la structure*, Paris, Alcan.
- Ruyer, R. [1940a], L'individualité, in: *Revue de métaphysique et de morale* 3, 286-304.
- Ruyer, R. [1940b], L'individualité (suite et fin), in: *Revue de métaphysique et de morale* 4, 386-410.
- Ruyer, R. [1952a], *Néo-finalisme*, Paris, Presses Universitaires de France.
- Ruyer, R. [1952b], Le problème de l'information et la cybernétique, in: *Journal de psychologie normale et pathologique* 45, 385-418.
- Ruyer, R. [1958], *La genèse des formes vivantes*, Paris, Flammarion.
- Ruyer, R. [2013], *L'Embryogenèse du monde et le Dieu silencieux*, ed. F. Colonna, Paris, Klicksiek.
- Sauvagnargues, A. [2012], Deleuze, Simondon, and the construction of transcendental empiricism, in: *Pli*, Special Volume, 1-21.
- Simondon, G. [1960], Forme, information, potentiels. Séance du 27 Février 1960, in: *Bulletin de la Société française de philosophie* 52 (4), 175-188.
- Simondon, G. [2005], *L'individuation à la lumière des notions de forme et d'information*, Grenoble, Millon.
- Simondon, G. [2016], *Sur la philosophie. 1950-1980*, Paris, Presses Universitaires de France.
- Tedesco, S. [2012], L'origine come *materia comune*, in: *Fata Morgana* 4 (16), 127-143.
- Van Eynde, L. [2005], La relazione tra essenza ed evento come fulcro del modello scientifico di Goethe, in: G. Frigo, R. Simili, F. Vercellone, D. von Engelhardt (eds.), *Arte, scienza e natura in Goethe*, Torino, Trauben, 95-112.
- Vercellone, F., Tedesco, S. (eds.) [2020], *Glossary of Morphology*, Cham, Springer.

- Vecchi, D., Miquel, P.-A., Hernández, I. [2019], From biological determination to entangled causation, in: *Acta Biotheoretica* 67 (1), 19-46.
- Wolfe, C.T. [2015], Was Canguilhem a biochauvinist? Goldstein, Canguilhem and the project of biophilosophy, in: D. Meacham (ed.), *Medicine and Society. New Perspectives in Continental Philosophy*, Berlin/New York, Springer, 197-212.
- Wolfe, C.T., Wong, A. [2015], The return of vitalism: Canguilhem, Bergson and the project of a biophilosophy, in: M. de Beistegui, G. Bianco, M. Gracieuse (eds.), *The Care of Life: Transdisciplinary Perspectives in Bioethics and Biopolitics*, London/New York, Rowman & Littlefield, 63-78.
- Wolff, É. [1948], *La science des monstres*, Paris, Gallimard.
- Worms, F. [2009], Il problema del vivente e la filosofia del XX secolo in Francia, in: *Discipline Filosofiche* 19 (1), 61-74.
- Worms, F. [2013], Le nouveau problème du vivant et la philosophie contemporaine, in: *Cités* 56 (4), 119-131.
- Worms, F. [2018], A partire da Bergson. Intervista a Frédéric Worms, a cura di Caterina Zanfi, in: *Lo Sguardo* 26 (1), 185-192.
- Zammito, J.H. [2018], *The Gestation of German Biology. Philosophy and Physiology from Stahl to Schelling*, Chicago/London, University of Chicago Press.
- Zanfi, C. [2013], *Bergson e la filosofia tedesca. 1907-1932*, Macerata, Quodlibet.

## Keywords

Living Form; Biophilosophy; Morphology; Morphogenesis; Vitalism

## Abstract

Philosophical morphology carries on a difficult tradition, bound with different currents and periods of thought. During the 20<sup>th</sup> century, an original and profound reflection on the living form can be recognized in the so-called French biophilosophy. Morphology, thus, seems to re-emerge under the guise of a post-critical ontology of becoming. Thinkers like Raymond Ruyer, Gilbert Simondon and Gilles Deleuze

showed that they were deeply aware of the manifold issues revolving around the notion of form and of their interconnections, and were able to provide original solutions to these problems in the framework of their thought systems. More recently, these reflections have asserted themselves in virtue of their coherence and their speculative force. This paper aims at a theoretical overview of the morphological spirit of biophilosophy that retraces the complex exchanges of influences between these three significant thinkers, Ruyer, Simondon and Deleuze. Along the focal nodes of temporality, spatiality and individuality, a renewed image of philosophical morphology will result from the vitality of their theoretical proposals.

Gregorio Tenti  
Università degli Studi di Genova (FINO Consortium)  
E-mail: [grgr.tenti@gmail.com](mailto:grgr.tenti@gmail.com)



## MATHILDE TAHAR

THE “HISTORY” OF BIODIVERSITY.  
A BERGSONIAN LOOK AT THE  
THEORY OF EVOLUTION

TABLE OF CONTENTS: *1. Introduction; 2. Evolution is not a Panglossian tale; 3. Biological evolution: A Metaphysical Object; 4. The history of biodiversity: a creative spiral of novelties; 5. Conclusion.*

*1. Introduction*

The Darwinism of our times is based on two principles: natural selection as a mechanism that explains evolution; the gene as the unit on which selection acts. From the initial conditions – the genes that tend to reproduce through the organisms they program, and the environment in which these organisms develop and struggle for existence – one can deduce, through the mechanism of “natural selection”, the way in which these organisms will evolve, that is, the genes that have been selected. Hence Richard Dawkins was able to say that evolution is almost fully understood today. And it is true that most of the questions about adaptation can be answered: i.e. how a species with such and such characteristics can evolve under such and such a condition.

Stephen Jay Gould, on the other hand, considered evolution to be a phenomenon about which almost nothing is known. Indeed, Gould was less interested in the mechanisms underlying adaptation, which indeed seem to be explained by the combination of Darwinism and genetics, than in the form taken by biodiversity: Why this form and not another? Why this organization and not another? While Neo-Darwinism may provide an explanation for the sexuality of Thyme, it does not tell us why pigs have no wings. Certainly, the metaphor of the “selfish gene” shows what is maintained throughout Evolution, and natural selection provides an adequate description of a large part of evolutionary change, but they do not give an understanding of why there is change, let alone

to predict the form it will take. Bergson had already formulated this critique in 1907 in *Creative Evolution* against the evolutionary theories of his time: they do not allow to grasp the formation of novelties in evolution because they do not conceive of duration. It is because Bergson brings to light the temporal aspect, this memory of the evolutionary process, that his theory seems to highlight, even today, the problems posed by evolutionary explanations. By making biology a world strictly determined by necessary laws, Neo-Darwinism in fact misses the historical dimension of evolution which Darwin himself tried to account for through the all too often forgotten “principle of divergence”. What does it mean to claim that biological evolution is history? What does that bring to the understanding of evolution?

## 2. *Evolution is not a Panglossian tale*

To begin with, it must be understood that evolution is not the history of adaptations towards an optimum: it does not work like a Panglossian tale. Voltaire’s character believes «that things cannot be otherwise, because everything being made for an end, everything is necessarily for the best end. [...] Noses were made for wearing glasses, so we have glasses» [Voltaire 1759/2017, 4]. For Pangloss, the history of the world looks like a tale where obstacles lead to a crisis situation that exists only through its resolution, which brings about a more desirable state. All characters and events are oriented towards this optimal situation. What is the relation between Panglossian finalism and the theory of evolution by natural selection?

For Darwin, in *The Origin of Species*, the adaptation of organisms to their environment is the problematic phenomenon. To explain that, Darwin starts from domestic selection: our pears are juicier than Pliny’s because over the centuries man has replanted the seeds of the juiciest pears not the blandest: pears were selected to be juicier. From that, he deduced the existence of variations between individuals and the possibility of a natural selection of these variations, in other words, the preservation of useful variations in the struggle for existence, however small the advantage provided, and the disappearance of the harmful ones. But it led some interpreters of Darwin to adaptationist explana-

tions: the use of the organ could make it possible to deduce the reason for its genesis. Darwin proposes natural selection as an explanation for adaptation; adaptationists propose to explain the appearance of the trait by its adaptation, which implies that one can ask what a trait is selected *for* and give the reason for its appearance based on this purpose. Thus, if seagulls have wings it is because they are «excellently adapted for flight in a medium having the specific density and viscosity of the atmosphere within a thousand meters or so of the surface of the Earth» [Dennett 2014, 197]. Adaptations are understood as answers to the problems raised by the medium, and the similarity between living beings on different phyla by the similarity of the problems encountered. Hence, under the guise of a strictly mechanistic explanation by natural selection, it is the old finalism that we find. This implicit recourse to the finalism inherent in evolutionary theories was already the subject of Bergson’s criticisms at the beginning of the twentieth century:

If there is [...] adaptation, it will be in the sense in which one may say of the solution of problem of geometry [...] that it is adapted to the conditions. [It] explains why different evolutionary processes result in similar forms: the same problem, of course, calls for the same solution. But it is necessary then to introduce, as for the solution of a problem of geometry, an intelligent activity, or at least a cause which behaves in the same way [Bergson 1907/1911, 58].

The deterministic mechanism, supposedly metaphysically neutral, supposes in reality a finality «more than ever charged with anthropomorphic elements» [*ibid.*]: the metaphor of the machine only hides the divine reference.

That explanation is not only finalist, it is also heuristically circular. That’s what philosopher Jerry Fodor points out in his controversial book *What Darwin got wrong*. In Darwin’s artificial selection, organisms are selected for an interest defined by the breeder. But in the case of nature, the selection happens without a defined interest; what an organism is selected for is adaptation to the environment. But how to define the environment of a living being? One usually finds in the environment what is relevant to a living being, calls it a niche, and then says that the living

being has adapted to that niche. «But that there are spiders, who would have guessed how to spin webs to catch flies is an ecological problem?» [Fodor *et al.* 2011, 140]. The evolution of biological forms cannot be understood as answers to the successive problems posed by their environment, since the environment and the problems it poses are defined on the basis of phenotypical traits that are assumed to be adaptations. Wondering whether the dodo has lost its ecological niche or whether the opposite has happened, Fodor answers: «The extinction of the dodo was the very same event as the extinction of the dodo's way of making a living so neither can serve to explain the other» [*ibid.*, 147].

Finally, while natural selection seems to adequately describe the apparition of a form adapted to an environment, it cannot explain the absence of a certain form. As Fodor points out, if, instead of asking why organisms have similar traits in similar environments, we ask why certain traits do not exist, the selectionist explanation becomes absurd. «Nobody, not even the most ravaging of adaptationists, would seek to explain the absence of winged pigs by claiming that, though there used to be some, the wings proved to be a liability, so nature selected against them. Nobody expects to find fossils of a species of winged pig that has now gone extinct. Rather, pigs lack wings because there's no place on pigs to put them» [Fodor 2007, 21].

Thus, an explanation of evolution that would stick to natural selection alone is implicitly finalist, and, purged of this finalism, it risks falling into tautology. Moreover, it would be insufficient, since it would not take into account the internal constraints of organisms. Let us now examine these constraints, starting with those that have been crucial in the Modern Synthesis: genetics.

What genetics brings to the mechanism of natural selection is the unit of selection: the gene. But again, the explanation does not escape finalism, since nature is interpreted as having a purpose: the survival of the gene. For Dawkins, in *The Selfish gene*, to define evolution by natural selection as the process by which genes increase their reproductive capacity is to say that biodiversity in its entirety can be understood by referring to the interest of the gene. Accordingly we read that what is important in evolution is «the good of the individual (or the gene)» [Dawkins 1976/2006, 2], an argument from which it can be said that

«the predominant quality to be expected in a successful gene is ruthless selfishness» [*ibid.*] and that the «fundamental law» of evolution is «gene selfishness» [Dawkins 1976/2006, 6]. Every phenotypic trait is explained by the interest of the gene. In consequence, if organisms can behave altruistically, it is precisely *for* the survival of genes. According to Dawkins, genes behave in this way because of «blind natural selection» [*ibid.*, 196]. To truly understand evolution by natural selection, we must therefore consider that it acts with an apparent goal: the survival of genetic information, the destiny of evolution resulting this time from the “goals” of each gene, and no longer from the intelligence of an omniscient engineer. If genes do not have conscious purposes, they do have an unconscious one: survival, which explains the finalized appearance of evolution in general.

Coordinated this way, genetics and natural selection present a doubly finalized mechanism. Genes seem to be both the programs and programmers of the biosphere: they appear as small engineers designing the machines (organisms) for the sole purpose of their own survival. Natural selection, on the other hand, appears to be a finalized mechanism directed towards the increasingly optimal adaptation of species to their environment for genetic survival. Although Darwin was more cautious than his interpreters, there was already a temptation of this kind in his early works:

Let us now suppose a Being with penetration sufficient to perceive differences in the outer and innermost organization quite imperceptible to man, and with forethought extending over future centuries to watch with unerring care and select for any object the offspring of an organism produced under the foregoing circumstances; I can see no conceivable reason why he could not form a new race (or several were he to separate the stock of the original organism and work on several islands) adapted to new ends [Darwin 1909, 85].

There would thus be a “demon of natural selection”, similar to Laplace’s “demon”. Laplace’s hypothesis was that an omniscient observer who knew the laws of physics and the initial conditions of the motion of each body in the universe at a time  $t_1$  would be able to predict its final state

at  $t_2$ . In this case again, Bergson's philosophy offers a valid critique of this hypothesis of a superhuman intelligence capable of embracing the entire universe precisely because it implies the universe thought of as a whole: a closed system analogous to that which the machine is to the engineer who designs it [Bergson 1907/1911, 37-39]. Therefore, the universe is reduced to an object, which can only exist if we implicitly accept the existence of a metaphysical entity capable of embracing it: the eye of the demon.

To think of evolution as a system strictly determined by a single mechanism towards an optimal situation is in fact to think of nature as a closed system, where nature appears as doubly indefinite, both diachronically (it is a process) and synchronously because of the multitude of its interactions sometimes conflicting, and the different levels of causality involved.

### *3. Biological evolution: A Metaphysical Object*

Evolution, in fact, cannot be a deterministic system of the Laplacian type, because it is *not* closed, it is not an object that an observer could walk around. There is a *meta*-physical dimension to life as well as to the world in Kant's philosophy: it goes beyond the experience that we can have of it, not because of our ignorance, but because of this double openness, synchronic and diachronic, which characterizes evolution in general as well as each living being. «A living being [is] distinguished from all that our perception or our science isolates or closes artificially» [Bergson 1907/1911, 15]. Because of this indeterminacy of life and the complexity of interactions that characterizes it, it seems impossible to order by any kind of algorithm, without falling into a peremptory anthropomorphism. Yet, it is what Daniel Dennett claims to do in *Darwin's dangerous idea*. He posits that natural selection is a machine for sorting out blind variations, a technological tool, i.e. a set of constraints added to the physical conditions to allow the emergence of a function. Dennett presupposes a Mendel Library, which would correspond to all possible genomes; and a Design Space, which would contain all possible phenotypes that may result from a combination of genes. The algorithm updates the phenotypes by searching for them in the Possibilities

Space and constructing them on the basis of the available genetic “recipes”. This implies, on the one hand, that the organisms are artifacts constructed unilaterally by an ingenious genetic mechanism (whose engineer cannot be found), on the other hand, that all biological possibilities are already given. Bergson already criticized this fixed vision of the organism, and this excessive pretension of logical intelligence in the face of the unpredictability of living things:

We [...] feel that not one of the categories of our thought [...] applies exactly to the things of life: who can say where individuality begins and ends, whether the living being is one or many [...]? In vain we force the living into this or that of our molds. All the molds crack [...]. And most often, when experience has finally shown us how life goes to work to obtain a certain result, we find its way of working is just that of which we should never have thought [Bergson 1907/1911, X].

Indeed, the living world is characterized by unpredictability that is not due to our ignorance, but to the very nature of evolution: because of its causal pluralism, each biological situation is unique. Therefore, laws in biology would imply taking into consideration a quasi-infinite number of particular parameters. It is only arbitrarily that we can turn nature into a closed system with only a few parameters, unchanged from place to place and from time to time. In order to find laws in biology as predictive as physicochemical laws, we would have to take into account interactions at extraordinarily heterogeneous levels: the molecule, the gene, the cell, their interactions, development, the interaction of tissues, the interaction of organisms... Moreover, these different levels are studied by sciences just as diverse: genetics, molecular biology, ethology, geology... Finally, these levels are distinguished only artificially: one cannot close a living system with regard to another in order to study natural selection only at its level. Symbiosis phenomena in particular defy traditional distinctions: some organisms are composed of several distinct species, inviting us to think of the evolutionary process not only as an intergenerational phenomenon, but also as “horizontal”, by community assembly. For instance, mycorrhizae, born from the association between a mycorrhizal fungus and the root of a plant: the fungi promote

the absorption of nutrients while providing a bulwark against pollutants for the roots also gain sugar. The complexity required by the laws of evolution is unprecedented in other sciences. As Fodor points out, where the laws of gravity need only a few parameters to account for the multitude of phenomena they explain, the laws of evolution would require placeholders for each type of living being to which they apply and for each type of environment with which these creatures interact [Fodor *et al.* 2011, 183-186]. The organism is at the intersection of extremely diverse levels of causality, and it is precisely this interpenetration of causal chains that we could describe as contingent, i.e. unpredictable.

Besides, biodiversity is not a fixed entity, but is always in the process of becoming. We do not have before us evolved species, but evolutionary *change*. When it comes to living beings, nature, which is always thought of as the realm of ahistorical necessity, comes curiously close to our history. As with human history, it is impossible to make predictions about biological evolution, because the temporality of the phenomenon implies the bringing together of beings and environments that had never been brought together before. This is what Bergson already understood very well: there is a historicity of biological phenomena, which means that, if the birth of a species can be linked to precise causes, «this can only mean that if, after the fact, we could know these causes in detail, we could explain by them the form that has been produced; foreseeing the form is out of the question» [Bergson 1907/1911, 27]. Despite being fiercely Darwinian, biologist Ronald Fisher nevertheless underlines the radical unpredictability of evolution by referring to Bergson: it is «thinkable in an indeterministic world, in which the causative system might indeed have been different. It is quite unthinkable in a strictly deterministic world. Looking back at the cause we can recognize it as creative; it has brought about something which could not have been predicted – something which cannot be referred back to antecedent events» [Fisher 1952, 350]. This unpredictability stems from the fact that the phenotype of an organism is not simply the product of its genotype and the environment in which it evolves, but also of its phenotypic *history*. Darwin said something similar about *Malaxis paludosa*. The ovary of the orchid is twisted 180 degrees in a normal situation (so that the labellum serves as a landing strip in *Ophris*). In *Malaxis*, the labellum, which is used to



protect the pollen bags, is twisted 360 degrees. Without torsion, there would be exactly the same result. But because of the orchid’s antecedent torsion, the adaptation was made in the sense of an accentuation of the torsion [Darwin 1862/2016, 200]. This irreversibility is linked to heredity, which transmits both the traits born of adaptation through natural selection (even if they are no longer adaptive at present; as long as they are not harmful either) and the consequent non-adaptive traits of other structural traits. These traits, which Gould and Lewontin call “structural expansions”, become structural constraints but form an exaptive reserve: they can be co-opted later according to their usefulness in relation to the environment. Thus, some traits not directly shaped by natural selection that constitute structural constraints may prove adaptive later on [Gould *et al.* 1979]. The inadequacy of cause and effect, in such a way that the cause does not make it possible to predict the effect, is part of the contingency of the evolutive process. In an article Ruyer devotes to one of Bergson’s examples, one reads that the evolutionary history of Paralytic Hymenoptera resembles a «“history” in the strong sense of the word, a complex and capricious political or linguistic evolution. [... It is] a mixture of organization and chance, of fortuitous displacements of meaning, of improvisations according to circumstances, and of catching-up by makeshift means» [Ruyer 1959, 176, my translation]. Evolution is not a harmonious story: it is made up of maladjustments and antagonisms. It does not function at all like a well-oiled machine in which each part is perfectly adapted to all the others; on the contrary, it manifests conflicts, inappropriateness, regressions; there is contingency everywhere. Ruyer’s description of the dynamic “history” of evolution seem to reveal all his debts to the Bergsonian idea that the organized world is not all harmonious: «Nature [...] everywhere presents disorder alongside of order, retrogression alongside of progress» [Bergson 1907/1911, 40].

In that case, would we be facing a vaudeville, where the story is interspersed with songs unnecessary to the plot? A plot that is itself constantly interspersed with unexpected jolts due to misunderstandings that bring together the most unlikely causal chains, to the point of ending up in funny situations like the panda’s thumb (which is actually a carpus bone) [Gould, 1980]?

#### 4. *The history of biodiversity: a creative spiral of novelties*

«The present moment of a living body does not find its explanation in the moment immediately before [...] *all* the past of the organism must be added to that moment, its heredity – in fact, the whole of a very long history» [Bergson 1907/1911, 20]. Evolution is a *historical* phenomenon; namely, it is part of duration, or rather it *is* duration: a continuous, dynamic and multiple totality – not a simple succession. What makes biodiversity what it is today is not the immediately preceding moment, but its entire history, just as a person who falls asleep looking at a pendulum does not fall asleep because of the last perceived movement but it is «the rhythmic organization of the whole» that leads him to sleep [Bergson 1889/1910, 106]. Biological evolution has a memory that produces future biological novelties. There is a «real persistence of the past in the present» [Bergson 1889/1910, 22]. The complexity of the interactions within the living implies a particular contingency which is not pure probabilistic chance, but which is part of the historical character of the living. The same contingency implied by this durational aspect of evolution has been more recently suggested by Stephen J. Gould, inasmuch as it keeps the biologist from seeing evolution under the eye of the Darwinian demon. Through punctuated equilibrium (the idea that the variability of species has a certain *rhythm*: phases of stability then phases of rapid change) and the discreet introduction of the possibility of catastrophic factors, Gould introduces historical contingency through a thought of duration: according to him, the living weaves together and without contradictions scientific determinism and historical contingency. Nature is neither a closed system artificially objectified by science, nor an abstract metaphysical entity, but a historical process: biological history creates its own possibilities.

Does this mean that we are dealing with an inconsistent phenomenon? Can we understand the complexity of this creative process of novelty? I think so, as long as we limit our claims to an understanding rather than a prediction of the evolutive process. For this, we will refer to the work of Brooks and Wiley in *Evolution as entropy*. Their aim is to untie the apparent paradox of the law of entropy in physics and of the increase of organization in organisms as well as in biodiversity. They want to show that evolution is indeed an entropic phenomenon, but that

it does not prevent the growth in complexity and the realization of innovative forms. They begin with the observation that organisms are the only systems that have instructional and not only structural information. Organisms carry their detailed blueprint with them and are able to refer to it to self-organize where the steam engine plan remains on the engineer’s desk. In terms of information, living systems are closed: the environment cannot directly produce instructional information although it can indirectly cause changes in that information. As with any closed system, an increase in informational entropy will be observed through the processes (translation, transcription, duplication...). Suppose there is a phase space which corresponds to the number of possible genotypes, each micro-state being a genotype, the macro-state being the actual distribution of individuals in different possible genotypes. Entropy will be the measure of this distribution in relation to the phase space.

Evolution is an entropic phenomenon: organisms occupy more and more microstates. In that case, how can there be more organization at the same time, i.e. a greater distance from randomness? The paradox is solved if we realize that evolution is a phenomenon far from equilibrium that is characterized by an increase in phase space that is *faster* than the realized increase in entropy: namely, there is a tendency for the realized variation to *lag behind* the maximum possible diversity. The realized entropy increases, but at a slower rate than the maximum possible entropy. Organization emerges from this rhythm gap, thus from historical temporality. It is mainly history that explains the coordination of the increase in complexity (entropy) and organization. Indeed, while natural selection eliminates some phenotypes and therefore the corresponding genotypes, it is history above all that clarifies the gap between what is and what could have been: the main reason for this growing gap between the diversity of possible genotypes and the actual distribution of genotypes is that certain genotypic combinations are made impossible by speciation, which has distributed the genetic information in different lines (the Darwinian principle of divergence). Once again it is very close to what can be read in Bergson when he writes that «in evolving in the direction of the vertebrates in general, of man and intellect in particular, life has had to abandon by the way many elements incompatible with this particular mode of organization» [Bergson 1907/1911, 49].

Another reason (still historical) is the ontogenetic constraint that blocks the realization of certain genotypes, even though these unrealized genotypes may represent accessible microstates. What Wiley and Brooks are highlighting is the explanatory role of history in understanding biological complexity. Evolution as a process creates its own causes and its own conditions: historicity creates the obstacles as well as the possibilities of the evolutionary process. The specificity of biology is therefore not a metaphysical mystery, but a historical and thus undeterministic causality: in biology, history is not only a degradation of energy and a tendency to disorder, but the creation of new possibilities as well as new obstacles, starting from the development of the initial conditions.

That being said, how should this historical causality be understood? I propose the image of a *durational* and therefore *creative spiral*. Indeed, the evolutionary process is close to a recursive causality, as defined by Edgar Morin: a circular causality whose effects produce future causes and possibilities and therefore are necessary for the perpetuation of the loop (the product becomes a producer). But we must complete this recursive causality, because what Darwinism teaches us is that in evolution, there is no simple organization based on effects; there is what Bergson would describe as a *backward* harmony: the identity of a genetic heritage, a coherence coming from common ancestors. In fact, scientists have recently discovered that the development of organisms that are very different phylogenetically involved homologous genes or had used the same genetic circuits. This is the case of the *Hox* genes which are present in all bilaterally symmetrical animals and are responsible for the establishment of structures along the antero-posterior axis, in both vertebrates and insects (which have a homologous genetic complex: *Hom*). If the homologous gene found in mice is inserted into a mutant fly, it works and fulfills the role of the regular fly gene. Another type of parallelism observed in organisms very distant from each other is explained by the recruitment of the same genetic circuits. This is the case of *Pax-6*, which is found in several phyla: cephalopods and humans, and has homologues in drosophila and fish. Its role is to control the action of other genes that are specific to different species and whose effect is to result in eyes also specific to those species. «Harmony is rather behind us [the unity of a genetic heritage] than before [the pheno-

typic diversity]. [Unity comes from a *vis a tergo*: added from the French version, Bergson 1907/2007, 104, my translation] it is due to an identity of impulsion and not to a common aspiration» [Bergson 1907/1911, 51]. This implies that the unity we have spoken of is not only descriptive but *driving*. This is suggested by Gould’s hypothesis that homologous regulatory genes are likely to play a key role in achieving rapid evolutionary change due to the constraint of a limited range of developmental pathways.

It is the *inadequacy* of the creative potential of the living and the constraints of its development that is the driving force behind the historical process of evolution. This means that in a certain sense evolution *shapes itself* through its antagonisms as it produces its problems as well as its solutions. Bergson writes about human history: «action on the move creates its own route, creates to a very great extent the conditions under which it is to be fulfilled, and thus baffles all calculation» [Bergson 1932/1977, 296]. Something similar happens in biological evolution: biodiversity is built up from its history. *The living is only rich in its future possibilities through its past history, as this history is both an obstacle to overcome and a reserve of novelties*. Therefore, the duration of evolution is not only a succession but also a recapitulation, which allows the story not to be repetitive but evolutionary. «The pendulum here is endowed with memory and is not the same when it swings back as on the outward swing, since it is then richer by all the intermediate experience. This is why the image of a spiral movement, which has sometimes been used, is perhaps more correct than that of the oscillations of a pendulum» [*ibid.*, 292]. *Biodiversity is the offspring of history*: the present cannot resemble the past in biology, because it is enriched by the entire movement that preceded it.

As we have said, this story is made up of maladjustments, evolutionary absurdities, and conflicts between species, but it is precisely these dissonances that make biological evolution perpetually creative: it is not so much an ordered mechanism as a perpetual *reorganization* based on a constantly *renewed disorder*; Bergson speaks of «*a reality which is making itself in a reality which is unmaking itself*» [Bergson 1907/1911, 248]. We have spoken of a spiral to describe the process of evolution, but more accurately, it would be a spiral *drawn by an unbal-*

*anced spinning top*: the adaptation of organisms to their environment is spectacular *because* biological harmony is threatened by imbalance, be it antagonisms between species or changes in environmental conditions. «This harmony is far from being as perfect as it has been claimed to be. It admits of much discord, because each species [...] tends to use this energy in its own interest; in *this consists adaptation*» [*ibid.*, 50]. Rather than understanding this organization as the product of the invisible engineer of natural selection and resorting to finalism, Bergson proposes to grasp it through the ontological unity of the living, which is that of its *history*: antagonisms that can be transformed into self-organizing interactions. «[Evolution] will have to make the best of these circumstances, neutralize their inconveniences and utilize their advantages – in short, respond to outer actions» [*ibid.*, 58]. It is through the obstacles that the complexity of biodiversity, of living beings and of their environment is born – a complexity whose organization creates novelty. The history of life does not consist of a continuous optimization of adaptation but rather of a series of unpredictable diversions. Evolution is *organization of disorder*, an organization perpetually contradicted, and therefore perpetually *creative*. It is *in* and *through* imbalance that the organization emerges.

Evolution is the flourishing of unpredictable possibilities whose contradictions result in an unbalanced organization. The evolutionary process is that organization of diachronic and synchronic antagonisms whose complementarity and overcoming are a creative enrichment of new evolutionary potentialities. Therefore, the living is not a deterministic and ahistorical realm, but that does not make it either a Panglossian tale where fatality reigns, or an incoherent vaudeville. It is a history in the strong sense of the word: a story in the making and to be told.

## 5. Conclusion

This is why, according to us, evolution is less the unfolding of a mechanism than the history of living beings. It is a reality that is made by the history of living beings that create both the obstacles and the conditions of possibility of overcoming this obstacle by the creativity of their interactions as well as their antagonisms. It is obstacles and evolutive

absurdities that generate coherence. The understanding we have proposed of evolution as a creative spiral is certainly not a scientific model, but a philosophical conception that must be a call to think, just as Kant imagined an “endless finalism” in History as a heuristic horizon to guide both historians and men who make History. Beyond the tragedy of chance and the tragedy of fate is the possibility of a coherence that does not exclude surprises, because it emerges precisely from creative causation. The history of biodiversity is therefore neither the unfolding of a destiny nor a succession of absurd events; it is a *time spiral*: the organization emerges from the coordinated discordances of past history. What does that mean for us? As Stephen J. Gould said, «We are all the offspring of history, and must establish our own paths in this most diverse and interesting of conceivable universes – one indifferent to our suffering, and therefore offering us maximum freedom to thrive, or fail, in our own chosen way» [Gould 1989, 323].

## References

- Bergson, H. [1910], *Time and Free Will: An Essay on the Immediate Data of Consciousness*, ed. and trans. F.L. Pogson, London, George Allen and Unwin LTD. (Original work published 1889)
- Bergson, H. [1911], *Creative Evolution*, ed. and trans. A. Mitchell, New York, Henry Holt and Company. (Original work published 1907)
- Bergson, H. [1977], *The Two Sources of Morality and Religion*, ed. and trans. R.A. Audra, C. Brereton, Notre Dame, University of Notre Dame Press. (Original work published 1932)
- Bergson, H. [2007], *L'Évolution créatrice*, ed. A. François, Paris, PUF. (Original work published 1907)
- Dennet, D.C. [2014], *Darwin's Dangerous Idea: Evolution and the Meanings of Life*, New York, Simon and Schuster.
- Darwin, C. [1998], *On the Origin of Species*, ed. G. Beer, Oxford, Oxford University Press. (Original work published 1859)
- Darwin, C. [1909], *The Foundations of The Origin of Species. Two Essays written in 1842 and 1844*, ed. F. Darwin, Cambridge, Cam-



bridge University Press.

- Darwin, C. [2016], *The Works of Charles Darwin: Vol 17: The Various Contrivances by Which Orchids are Fertilised by Insects*, ed. P.H. Barrett, R.B. Freeman, Abingdon-on-Thames, Routledge. (Original work published 1862)
- Dawkins, R. [2006], *The Selfish Gene*, Oxford, Oxford University Press. (Original work published 1976)
- Fisher, R. [1952], Creative aspects of natural laws, in: *Philosophy of Science* 19 (4), 350-352.
- Fodor, J. [2007], Why pigs don't have wings, in: *London Review of Books* 29 (20), 19-22.
- Fodor, J., Piatelli-Palmarini, M. [2011], *What Darwin Got Wrong*, London, Profile Books.
- Gould, S.J., Lewontin, R. [1979], The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme, in: *Proceedings of the Royal Society of London*, B 205 (1161), 581-598.
- Gould, S. J. [1980], *The Panda's Thumb*, New York (NY), W.W. Norton & Company.
- Gould, S. J. [1989], *Wonderful Life*, New York (NY), W.W. Norton & Company.
- Ruyer, R. [1959], Bergson et le Sphex ammophile, in: *Revue de Métaphysique et de Morale* 64 (2), 163-179.
- Voltaire [2017], *Candide. The Best of All Possible Worlds*, ed. and trans. Nicolae Sfetcu, Multimedia Publishing. Retrieved from <https://www.setthings.com/en/e-books/candide-best-possible-worlds/> (Accessed April 12, 2020) (Original work published 1759)

## Keywords

Henri Bergson; Charles Darwin; Stephen Jay Gould; Richard Dawkins; Evolution; Adaptation; Natural Selection; Genetics



**Abstract**

Neo-Darwinism, through the combination of natural selection and genetics, has made possible an explanation of adaptive phenomena that claims to be devoid of metaphysical presuppositions. What Bergson already deplored and what we explore in this paper is the implicit finalism of such evolutionary explanations, which turn living beings into closed and static systems rather than understanding biological evolution as a process characterized by its interactions and temporal openness. Without denying the heuristic efficiency of the explanation resting upon natural selection, we analyze what it leaves out and what remains to be explored: the unpredictability of the evolutionary process. We will therefore study the role of contingency in evolution, as Stephen J. Gould proposed, but we will also consider the causality specific to the living world that makes it impossible to reduce it to a simple algorithm, as proposed by Daniel Dennett among others, since it is really a creative causation, or dialectical spiral.

Mathilde Tahar

PHD Student in Philosophy of Biology

at *ERRAPHIS* (Université Toulouse Jean-Jaurès) and at *Institut de Systématique, Evolution, Biodiversité* (Muséum National d’Histoire Naturelle-CNRS, UMR7205)

E-mail: mathildetahar@wanadoo.fr

PART II  
MORPHOLOGY, PLASTICITY,  
CONTINGENCY, AND FREEDOM

## PIER ALBERTO PORCEDDU CILIONE

BEYOND THE *ARCHÉ*. ARISTOTLE,  
GOETHE, HEIDEGGER, SCHÜRMAN

When, in 2013, Andrea Pinotti and Salvatore Tedesco published the volume *Estetica e Scienze della vita* [*Aesthetics and Life Sciences*], they contributed to revitalizing, within the Italian philosophical debate, the link that binds aesthetic reflection to some of the most debated issues of contemporary theoretical biology. What is the central theme of this disciplinary intertwining? Why, in general, is it possible to imagine a connection between these two disciplines? At the heart of this project is the possibility of rethinking the concept of nature – and our relationship with it –, trying to measure in what way biological reflection on life may integrate useful categories elaborated by aesthetics. Intertwining aesthetic reflection and theoretical biology means attempting to think of “nature” beyond the project of its integral quantification, mathematization and computability, typical of modern and contemporary sciences, but it is also a question of rejoining the phenomenological approach, through which it is possible to maintain the connection with the specific qualities of its phenomena. Only in this way can one attempt to understand nature “from within”, “*desde dentro*”, avoiding forcing the pragmatic and technologically oriented needs of our cognitive relationship with nature, typical of this epistemic phase of the hard sciences.

However, the contribution of aesthetics should not be thought of as the bearer of a mere “contemplative” and “living” sense of natural “beauty” but must be thought of in the name of the dialectical relationship between “nature” and “art”, between *physis* and *techne* – according to Goethe’s teaching –, and also as a trace of the metaphysical premises that gave rise to the possibility of that relationship. As Pinotti and Tedesco write, «Goethe was ready to see at work in the world of phenomena (which would then rigidly divide the sciences of nature and those of the spirit) a unitary game of forces» [Pinotti & Tedesco 2013,

9].<sup>1</sup> Goethe becomes the indispensable author for this recognition, insofar as he has seen, in the world's phenomena, a plan of creation, transformation, translation, immanent in a "*physis*" conceived as totality, within which the difference between "natural" and "artistic", between "biological" and "historical" dimensions, becomes problematic or, at least, no longer relevant, in order to think of the metamorphic generativity of Totality.

\*\*\*

What, then, is morphology? How should it be thought of, with respect to this conceptual background?<sup>2</sup> «Born in the biological field with Goethe's studies on the metamorphosis of plants, morphology, more than a discipline is a field of knowledge in which areas of study gravitate ranging from the morphogenesis of the cell to the evolution of living forms; from atomic forms visualization to the form of the elements, to the fields of forces, to the shape of galaxies and of the entire universe» [Di Napoli 2011, xiii].<sup>3</sup> It is therefore the universe, Nature, Totality, *physis* – and not merely the form –, the true object of morphology. Morphology describes nature *as* form, as *becoming* of forms. Since *physis*, from a Goethian point of view, is a creating totality, quivering with life, incessantly crossed by processes of *Bildung*, *Gestaltung*, *Umgestaltung*, the theory of this *physis*, that is a Goethian *physiká*, will be a theory of how – and possibly why – this «unitary play of forces» produces forms. It is in this strong sense that Goethe's morphological project must be understood. A poetically relevant example of this incessantly creating and

---

<sup>1</sup> «Goethe si disponeva a vedere all'opera nel mondo dei fenomeni (che si sarebbero poi rigidamente spartite le scienze della natura e quelle dello spirito) un gioco unitario di forze».

<sup>2</sup> For a general overview on the problem of form and morphology, see also Mazzocut-Mis [1995], Mazzocut-Mis [1997], Tedesco [2010] and Vercellone & Tedesco [2020].

<sup>3</sup> «Nata in ambito biologico con gli studi di Goethe sulla metamorfosi delle piante, la morfologia più che una disciplina è un campo del sapere in cui gravitano ambiti di studio che vanno dalla morfogenesi della cellula all'evoluzione delle forme viventi; dalla visualizzazione della forma dell'atomo, alla forma degli elementi, ai campi di forze, alla forma delle galassie e dell'universo intero».

transforming totality is represented by the poem *Eins und Alles*, where *physis* is crossed by an eternally operating “doing” (*Tun*), and this – in the strict sense – is “life”, *Leben*:

*Und umzuschaffen das Geschaffne,  
Damit sich's nicht zum Starren waffne,  
Wirkt ewiges, lebendiges Tun.  
Und was nicht war, nun will es werden,  
Zu reinen Sonnen, farbigen Erden,  
In keinem Falle darf es ruhn.*

*Es soll sich regen, schaffend handeln,  
Erst sich gestalten, dann verwandeln;  
Nur scheinbar steht's Momente still.  
Das Ewige regt sich fort in allen:  
Denn alles muß in Nichts zerfallen,  
Wenn es im Sein beharren will.  
[Goethe 2000a, 368, vv. 13-24]*

Here nature has been thought of as a totality in an eternal creative motion, where what has a “figure” is nothing but the “moment” of an apparent stasis. An invisible and eternal *arché* (*Das Ewige*) exists – and expresses itself – in all that exists. We do not understand much about Goethe’s morphological project, if we do not think about it in the context of this theory of wholeness. The form is not only valid as a metamorphic profile to be read within a simple biological transformation of the entity or of the species, but it must be understood as a moment of quiescence, a resting point, of a totality that incessantly reshapes itself. The secret of Goethian morphology is to pose the problem of the relationship between the form of the entity (the “foreground” form) and the total and eternal morphological matrix of Being (the “background” form). As Giuseppe Di Napoli writes in an exemplary way, «the form is what allows the distinction and therefore also the separation of being from nothing, from the isotropic background, from an extension of intangible space: it is the interface between being and the indistinct background of non-being» [Di Napoli 2011, 3].<sup>4</sup>

---

<sup>4</sup> «La forma è ciò che consente la distinzione e quindi anche la separazione dell’ente dal niente, dallo sfondo isotropo, da un’estensione di spazio intangibile: è l’interfac-

In this sense, Goethean morphology should not be read as a mere descriptive apparatus of the “nature” of form but as a theory of the genetic processes inscribed in the totality of *physis*, the formal “detachment” of the single entity from the continuity of an indistinct background. The «unitary play of forces» which are at work in the quivering totality of nature’s life produces forms, but this production of forms coincides with the very life of the eternally creating Totality. Life produces form, and form produces life. As Di Napoli points out, «only what has a form lives. The form, therefore, is itself alive, as it is what allows life» [Di Napoli 2011, xvi].<sup>5</sup> Therefore, it is starting from the forms that human intelligence can understand how, in general, “harmony” of forms, morphological connection and morphogenetic translation within nature is given. What is the fundamental place where the human being handles, understands, studies the form as such?

There is no doubt that for Goethe, and for the tradition that starts from his aesthetic teaching, this place is art, *Kunst*. Referring to Paul Klee, by the way a very attentive reader of Goethe’s writings, Di Napoli writes that «the artist, states Klee, must place himself in the point where things originate, where the *genesis* takes place as *creation*, where the whirling forces generate the original forms and primordial elements common to all beings, men, plants, minerals and all elements» [Di Napoli 2011, xvi].<sup>6</sup> In a perfectly Aristotelian-Goethean spirit, according to Di Napoli, «the artist does not imitate the forms produced by nature but the genetic process of formation, the morphogenetic principle from which they descend; it does not imitate nature as created, but as *naturans*, as a process of creation» [Di Napoli 2011, xvi].<sup>7</sup> The Goethean morphological tradition here illustrates how faithful it is to a certain Ar-

---

cia tra l’essere e l’indistinto sfondo del non-essere».

<sup>5</sup> «Solo ciò che ha una forma vive. La forma, dunque, è essa stessa viva, in quanto è ciò che consente la vita».

<sup>6</sup> «L’artista, dice Klee, deve porsi nel punto in cui hanno origine le cose, là dove ha luogo la *genesi* come *creazione*, dove le forze vorticose generano le forme originarie e primigenie comuni a tutti gli esseri, agli uomini, ai vegetali, ai minerali e a tutti gli elementi».

<sup>7</sup> «L’artista non imita le forme prodotte dalla natura ma il processo genetico di formazione, il principio morfogenetico da cui discendono; non imita la natura in quanto creato, ma in quanto *naturans*, in quanto processo di creazione».

istotelian suggestion: *physis* – and the “form” of *physis* – can certainly have an *ontological* primacy, but art, technology, has a *gnoseological* primacy. It is *Kunst* that makes us draw on what Karl Blossfeldt (also carefully observed by the “Goethian” Walter Benjamin) would have called the *Urformen der Kunst* – which are nothing more than “close-ups” of natural morphological details.<sup>8</sup>

\*\*\*

It is therefore misleading to think of Goethian morphology as a mere theory of form, as a mere contribution to a doctrine of metamorphosis, or as an opportunity for an “aesthetical” re-formulation of biological topics. In Goethe, morphology is given, because the form, the *morphé*, functions as a conceptual *medium* between “nature” and “art”, between *physis* and *téchne*, and only in this connection can we understand what “life”, *Leben*, and form-of-life is.<sup>9</sup> The dialectical correspondence between nature and artifice, between *physis* and *téchne*, between biological life and form-of-life, between nature and art, represents one of the fundamental oppositions within our philosophical tradition. However, Goethe receives and transforms this “doctrine”, thinking of it as an internal correlative of the eternally working life of Totality. This ambivalence is well described in the quatrain of one of his famous sonnets, with a vaguely autobiographical character:

*Natur und Kunst, sie scheinen sich zu fliehen,  
Und haben sich, eh' man es denkt, gefunden;  
Der Widerwille ist auch mir verschwunden,  
Und beide scheinen gleich mich anzuziehen.*  
[Goethe 2000a, 245, vv. 1-4]

It is in this specific context that it is necessary to think about the morphological link between nature and art. Goethean morphology, in the strict sense, is the metamorphic theory of this indistinct totality, where

<sup>8</sup> See K. Blossfeldt [1928]; W. Benjamin [1929/1972]. See also E. Haeckel [1904].

<sup>9</sup> For the concept of “form-of-life”, see Agamben [1998]. For these themes, see also Agamben [2003].

the very distinction between nature and art becomes problematic, to the point that it can be eventually suspended or erased. It is from this relationship that the metaphysical basis of morphology must be conceived, since form is the place where the connection between *Natur* and *Kunst*, between *physis* and *téchne* is “decided”, and where their *indistinction* is decided, by reason of a higher Wholeness, whose “life” and whose “forms” demand a higher “theory”. It is in this sense that morphology, by crossing the two domains transversally, is configured as the theoretical place where reflection on art and reflection on biology find their common ground.

\*\*\*

Therefore, one of the conceptually most productive intersections between aesthetics and life sciences is that of *form*. Form is the place of Being, in which something acquires the eidetic clipping of its presence and its individuality. The form is therefore an “object” of aesthetics, because it is through the perception and understanding of what has form that the “beautiful connection” between the *body* and the *psyche* is realized. Yet, form is also the place where the living is *realized*, and in the generative space of nature it becomes concretely present. It is to the *morphé* that the possibility for human intelligence to essentially know a “thing” is ascribed, and to understand the meaning of its genesis. Morphology, here, should be understood not only as a general theory of form but also, in a specifically Goethian sense, as a “knowledge” which, problematically suspending the difference between the realm of *physis* and that of *téchne*, opens up the possibility of the enigmatic indistinction between the two realms. The form-of-life and the form-of-art are regional specifications of an absolute morphological knowledge, in which the very distinction between nature and art, between the biological form and the artistic form, between life and the technical object becomes elusive.

In this sense, it can be said that the entire Goethean morphology is deeply indebted to an Aristotelian background. The idea that nature is the “space” of the becoming of form, that a well-formed thing is the place where organic matter assumes the teleologically ordered perspec-



tive of form, and that art represents a sort of “technical” fulfillment of nature are all ideas already traceable in Aristotelian physics. On closer inspection, Aristotelian physics represents neither a theory of matter (*hylologia*) nor an abstract theory of form (*morphologia*): it appears as a theory of the universal transformation, as a theory of the *kinesis* of Being, under an absolute metamorphic perspective, at the heart of which lies the problem of “justification” (*lógon didónai*) and of the “sense” of the transformation of every being. Goethe receives this idea, thinking of morphology not so much as a “static” theory of form, or as a “phenomenology” of natural forms – directly given to the eye of the observer – but rather as a theory of the genetic and formative process of all entities. It is therefore not a *Bild* theory but a *Bildung* theory, it is not a *Gestalt* theory but a *Gestaltung* theory.

The problem is therefore to think of the intrinsically formative and forming dynamics of nature and art, attempting to justify the absolute origin of form, and the teleological culmination that it represents for the entity. The problem that often haunts morphology is not being able to think originally about its connection with ontology and metaphysics. The problem is not to establish descriptively the morphological contour of the forms but rather to establish the “absolute cause” of their presence and configuration. The problem, both Aristotelian and Goethian, is establishing the *kinesis* of the form, its *arché* and its specific becoming. The ontological and metaphysical enigma of form is constituted by its very “presence”, by its very “realization”. The knowledge that metamorphosis needs is therefore an “*archeology*” of form. A question that runs through the entire history of Western philosophical civilization is whether there is a link, in general, between *arché* and *morphé*, how the form should be thought of *as arché* and the *arché as form*. What continues to create problems about form is the difficulty to see it simply from a scientific, descriptive, empirical, experimental point of view. Under this respect, scientific understanding of nature seems unable to *justify* the “absolute why” of the very *presence* of form and its *realization*. By slightly modifying the fundamental metaphysical question, one can ask: *why* is form *given* – in general? *Why* form – and not rather, the shapeless? What the science of life and the sciences of nature hardly manage to deal with is precisely the absolute point of onset of form: one

can describe the structure of a rose from a genetic and informational point of view, but no theory of matter seems to be able to explain why roses exist, and why roses have *that* shape and not another. Any purely deterministic-mechanistic, flat evolutionary or teleological-functionalistic explanation runs the risk of not grasping the “free” character of the form, its “*gift*” character, the inexplicable dehiscence of the form in the heart of the entity.<sup>10</sup> It is in this sense that the connection between morphology and metaphysics must be understood, triangulating it with the indispensable presence of a “pragmatics” and a “poietics” of form, that is the specific “form of doing” (*poiesis*, *Tun*) that art represents. What must be thought of in a theory of transformation, or in Goethian morphology, is the problem of establishing the “absolute beginning” of the form, or rather the absolute *arché* of its genesis.

Why, then, does morphology represent a fundamental knowledge for a “theory” of the entity and its transformative dynamics? The human being seems endowed with the strange ability to intuit the kinetic *arché* of being starting from its form, and therefore go back, with an imaginative effort, to the absolute origin of its transformation. The Aristotelian distinction between “nature” and “art” is based on the connection between *arché*, *kinesis* and *morphé*. But if the difference between *physis* and *téchne* is based on the concept of *arché kinéseos*, we must ask ourselves how well founded is the possibility of distinguishing the two domains, taking literally the Goethian hypothesis that this distinction is neither desirable nor possible.

\*\*\*

Aristotle, in the book A of *Physics* reminds us that all entities are *kinoumena*, that is, entities crossed by a transformative principle. All entities are in transformation, and this transformation is *kinesis*, the true object of both *Physics* and *Metaphysics*. In a famous passage from Book B, Aristotle recalls that in the whole circle of beings, it is possible to group things into two realms: on one hand, the φύσει ὄντα, the entities which are determined by φύσις, which are such “by nature”, “by virtue of

---

<sup>10</sup> In this perspective see also Caillois [1960] and Leghissa [1998].

φύσις”; on the other hand, the “artificial” entities, made “by art”, “ἀπὸ τέχνης”, products of human action, effects of ποιήσις, “ποιούμενα”. At the beginning of Book B, Aristotle makes clear that «τῶν ὄντων τὰ μὲν ἔστι φύσει, τὰ δὲ δι’ ἄλλας αἰτίας», («of beings in general, some are “by nature”, others through other causes») [Arist., *Ph.*, B, 1, 192b8]. According to Aristotle, the question of “technicality” or “artificiality” is to be considered immediately in connection with a theory of Nature (it is only with respect to a “natural” generation that one can speak of an “artificial” genesis/production). *Physics*, as the episteme that presides over the conceptualization of the production of Being as such, is at the same time *Metaphysics*. In his analysis of these Aristotelian topics, Heidegger points out that the *physiká* is the supreme thought of the Western world, «wherein Western historical humanity preserves the truth of its relations to beings as a whole and the truth about those beings themselves. In a quite essential sense, meta-physics is “physics”, i.e. knowledge of φύσις (ἐπιστήμη φυσική)» [Heidegger 1939/1998, 185].

How does one distinguish the products of nature from those of art? This is the decisive passage of the Aristotelian argument: «τούτων μὲν γὰρ ἕκαστον ἐν ἑαυτῷ ἀρχὴν ἔχει κινήσεως» («each of them has in itself the *arché* of the *kinesis*») [Arist., *Ph.*, B, 2, 192b13-14]. It is easy to understand that the essential determination of a natural entity must have *within itself* the principle, the command, of its own transformation, the origin and the code of its metamorphic development. An “original command” (*arché*) is embedded in the essence of the natural entity, a point of kinetic insurgency which presides over its “animation”. In this sense, Heidegger writes that «φύσις is the ἀρχή, it is the beginning and disposition of motility and stillness, and precisely of something ‘moved’ that has in itself this ἀρχή» [Heidegger 1939/1998, 191]. He goes on to underline that the «φύσις is ἀρχὴ κινήσεως – the provision that initiates change, in the sense that everything that changes has this provision within it» [Heidegger 1939/1998, 192].

It can therefore be said that the distinction between *physei onta* and *téchne onta* rests on the recognition that the first have *within themselves* the principle, the code, the command, the *incipit* (all senses inscribed in the term *arché*) of their genetic, morphogenetic, metamorphic process; the second, on the other hand, have *outside their essence* the princi-

ple, the code, the command, the *incipit* of their genetic, morphogenetic, metamorphic process. The distinction seems to be close to common sense. But how does human intelligence manage to guess if an entity possesses or does not possess within itself the principle, the morphogenetic and metamorphic command of its *kinesis*, of its transformation? The decisive answer is that that device is constituted by the form. It is through *morphé* that human psyche is able to retrace the genetic, kinetic and metamorphic principle of everything that exists. Not only is there a gnoseological connection between *psyché* and *morphé*, but this connection must also be related to the relationship between *arché* and *kinesis*. *Psyché, morphé, kinesis, arché*: the link between physics/metaphysics and morphology passes through these four terms. Oddly enough, human mind is able to discern the kinetic difference between *physei onta* and *téchne onta* by virtue of form. According to this determination, *physis* is nothing more than the place of an absolute *genesis*, the place where the purity of the *arché* is preserved. As Günter Figal writes in his fundamental text,

The originariness of life first becomes conspicuous in regard to movement. Although what is alive is also moved by something else, the essential thing is that it moves itself. This is reversible; what moves itself appears to be alive, say, the play of the clouds that reconfigures itself into ever new figures, the surge of the sea on the shore, the light on the surface of the water. But this liveliness is borrowed; it remains hidden that the movement derives from something else. The moving force, for example, the wind that drives the clouds on and thereby forms them into figures, recedes with the impression of liveliness. By contrast, something is genuinely alive when it actually moves on its own [*von sich aus*], *from itself* [*von selbst*]. For this “from itself” there is a Greek word: φύσις. One could translate the word with “nature” if the moment of significance that matters here were not precisely lost therein. φύσις indicates an occurrence; translated literally, φύσις is “growth.” Growth occurs always on its own, from itself. It is the essence of what one calls “natural” without hesitation. As this essence, it shows itself in natural things, and, conversely, it is the observation of natural things that discloses the essence that φύσις is [Figal 2010, 308].

The great problem of Aristotelian metaphysics is therefore that of justifying – giving reason – of this “changing” of being, of this transformation of being, in its totality. Form becomes the place where you decide on the “meaning” of universal *kinesis* and its beginning, its origin and its *end*. As Reiner Schürmann points out,

As we have seen, what strikes the mind in the Greek classical age is that there is becoming, and first of all a becoming of which man is the author and master. Both metaphysics and logic derive from the astonishment before what our hands can make out of some material. In Heidegger’s view the guiding meaning in Aristotle’s concept of origin results neither from speculation about being nor from the logic of knowledge, but from the analysis of becoming that affects material things [Schürmann 1987, 99].

The *kinesis* of the entity, the need for changing inscribed in the entity, is empirically revealed by the observation of the entity’s metamorphic “behavior”. (Does the morphological conformation of the species “change”? It is on this point that ancient and modern physics/biology diverge). Yet, the problem of the *arché* of form, its point of onset, its “sense” and its “meaning” remain intact.

That the φύσει ὄντα have an “urge to change” in themselves does not mean that they are grasped in perpetual change. The change to which they have an inborn urge goes back to them, that is, they can be described as changes of *this* φύσει ὄν. The change has its origin in this φύσει ὄν and is also in its course *its* change. Aristotle intends this – as Plato also already does – with the word ἀρχή. ἀρχή is a beginning that remains essential for what begins in it; ἀρχή is a governing beginning that never remains behind, and, in this, is *origin*. For something that moves itself and changes itself the beginning is originary, such that it is itself determined through originariness. φύσις is originariness; everything originary has the essence of φύσις. Change is always movement. As soon as something rests, it does not change but rather remains as it is. Yet, for φύσει ὄντα the “inborn” urge to change remains essential even when they are not in movement [Figal 2010, 309].

What connection is there then between *physis* and *arché*? How is the idea that nature is always the place where the “absolute beginning” of every *kinesis* and every morphogenesis is decided? How should the absolute beginning of form be thought, if form, *physis* and life, thought of at this metaphysical height, do they say “the same”? What exactly does it mean that, as Figal states, «φύσις is originariness»?

Insofar as φύσις is grasped as the determinative beginning of change, it has to do either with material or with form. The former is disregarded; φύσις is not the primary material which underlies everything that has the determinative beginning of movement and change. [...] Something does not count as an artifact when it exists solely in possibility but rather only when it is present in completion (ἐντελέχεια), that is, in its form, and has the εἶδος, that is, the figure or the look, of what it is supposed to be. This is also how it is for what is composed by φύσις: Flesh or also bone does not have its φύσις before it has taken on its identifiable look that helps us determinatively say what flesh and bone is [Figal 2010, 312].

Specifically,

[t]he idea outlined here can only serve to confirm Heidegger’s thesis, according to which Aristotle understands being as “being produced.” What is problematic about this understanding, however, may therefore be shown especially well with reference to it. It is by no means the case that the “on its own” is best disclosed on the basis of production. [...] The first thing to stand out is that in the Aristotelian considerations, the talk is no longer of φύσις as of a beginning or origin inherent in a living being; φύσις is here no longer life that is perceptible as independent rest and movement, but, rather, an instance of production understood in analogy to craft work. The idea is one in orientation from the ability of living beings to propagate, which Aristotle then understands based on craftsmanly production. That this is not unproblematic is revealed in the very talk of the “what is composed by φύσις” itself: A living being is not composed like a bedstead, but, rather, grows. Accordingly, understanding flesh and bone

in the sense of material is also not illuminating; the two are not present like tree trunks that may be cut and then, as wood, fashioned into a bedstead [Figal 2010, 312].

Once again, the destiny of philosophy is at stake, regarding the question of *arché*, and its connection with the kinetic explanation of form and being. The kinetic distinction between *physei onta* and *téchne onta* is therefore entirely inscribed in the problem of *arché*. To distinguish a “living” physical-natural entity from an artificial/technical one, there is no other way than tracing the kinetic *arché* of its genesis. *Arché* is *origin, beginning, command, code, point of onset*. *Physis*, precisely because it is the place of absolute *arché*, is also an unavoidable origin, absolute archaism. Every natural, living, biological being is “archaic”, because it has the original genetic command of *physis* in it. Each *physei on* is archaic, insofar as it is anchored to the absolute generativity of *physis*. It has in itself the archaic principle of an absolute origin that is both ontogenetic and phylogenetic: *morphé* names exactly the point of indistinction between the two planes. The technical-artistic thing, on the other hand, is different from the *physei on*, because it camouflages, simulates, disguises the originality/originariness of its genesis. What, in this theoretical framework, does not seem possible to dispute is that *physis* is the realm of *arché*, of absolute originality and originariness. Where there is *arché*, where there is originariness, there is *physis*. Yet something is not convincing. Putting the question in these terms, the connection between *physis*, *arché* and *morphé* risks being only partially clarified. First of all: how should the term ἀρχή be thought of?

The word ἀρχή seems to have entered philosophical language only with Plato and Aristotle. Aristotle is the one who explicitly joins the more ancient sense of inception with that of domination. From the time of Homer, the common meaning of the verb ἀρχή had been “to lead,” “to come first,” “to open,” for instance, a battle or a discourse. In the epic tradition, ἀρχή designates what is at the beginning, either in an order of succession in time, like childhood, or in an order of constitutive elements, as flour is the basis of dough or as the organs are the elementary parts of the body. The other meaning, that of command, of power, of



domination, although absent from Homer, is found in Herodotus and Pindar. Aristotle also uses the word in this sense. But the Aristotelian innovation consists in uniting the two senses, inception and domination, in the same abstract concept. Until the end of antiquity ἀρχή remains a technical term for designating the constitutive, abstract, and irreducible elements in being, becoming, and knowing. The metaphysical concept of ἀρχή expresses that abstract structural element in entities which, in their analysis, is *unhintergebar*, insurpassable. It is a concept thoroughly linked to the metaphysics of sensible substance and its “theory” [Schürmann 1987, 97].

Reiner Schürmann’s reception of these Aristotelian-Heideggerian themes opens up new perspectives. As is well known, Schürmann’s philosophical project is mainly aimed at continuing the deconstruction of metaphysics on the trail opened by Heidegger but going even further. It is no longer just a matter of rethinking the metaphysical lexicon and re-dyeing it to a more original lexicon but rather trying to challenge the very notion of originality/originariness, which for Schürmann is deeply linked to the conceptual value of “domination/power/command” inscribed in the term *arché*. According to the title of his masterpiece, Schürmann points out that it is a question of making the metaphysical lexicon, already examined by Heidegger’s critical analysis, pass from “principles” to “anarchy”. The question of universal *kinesis*, of its *arché*, and of the connection it has with the conceptual constellation *morphé/eidos/télos* becomes problematic, insofar as, as recalled by Figal, the Aristotelian approach looks at morphogenesis, the point of kinetic insurgence of the entity, within the productive, poietic paradigm, typical of art/technology: «In Heidegger’s view, the guiding meaning in Aristotle’s concept of origin results neither from speculation about being nor from the logic of knowledge, but from the analysis of becoming that affects material things» [Schürmann 1987, 99]. *Physis*, therefore, produces the *physei onta*, exactly through a poietic scheme that is that of *téchne*, of “art”.<sup>11</sup>

---

<sup>11</sup> On this point, see also Agamben [1999], Blumenberg [2013] and Blumenberg [2015].



According to Aristotle's *Physics*, material things in becoming are of two species: those that bear the origin of their movement in themselves and those that are moved by another. The former are "natural" in the strict sense, the latter are man-made. But where does such a distinction come from? What is the disjunctive factor between "moved by themselves – moved by man"? The *tertium comparationis* is movement, change, as such. As such? Is it some ideal representation that has made the quest for origin into a quest for causes? Or is it rather one very precise experience, namely, that of the movement and change initiated by us, which switched classical thought onto the track of causal explanations? In that case, it is only because man first grasps himself as architect, as initiator of fabrication, that nature can in turn appear to him as moved by the mechanisms of cause and effect. Growth, too, "begins" and "makes". Because the artisan experiences the origin of production as indigenous to himself, he finds another such origin in nature, concordant with although allogeneous to his own. The experience that guides the comprehension of origin as it is operative in the "philosophy of nature" is paradoxically the experience of fabricating tools and works of art, the experience of handiwork. In this way the Aristotelian tradition divides the totality of things into those moved by human hands and those moved by themselves [Schürmann 1987, 100-101].

But is this conceptual scheme always valid? The answer that Heidegger and Schürmann give to this question is negative. There is another way of thinking about the paradoxical "production" of the natural entity, of the living being, that is to listen, in the term *physis*, to its original "timbre", that of *birth, growth, manifestation, appearing, arising, "oriri"*. It is in this determination of *physis* (in which it is possible to hear the original "pre-Socratic" vibration), that the problem of birth/growth acquires its most explanatory value. It is therefore a question of proceeding with a deconstruction of that first sense of *physis*:

The most viable way of conducting the deconstruction of Aristotle's physics so as to return back beyond his concept of *arché* is to examine the scope of his "kinetic" understanding of nature. It does not appear to be coextensive with his concept of *physis*. A

residual factor remains once natural things are opposed to man-made things, and once these two species are combined under the common genus “moved things”. The specific differences, “physical” and “technical” movement, do not exhaust the phenomena that Aristotle calls natural. What is that residual factor that makes *physis* in the strict sense – as complementary to *techné* – remain a derivative notion in Aristotle? He owes this residual factor, Heidegger says, to his speaking Greek: in spite of the predominance of manipulable and manufactured objects in his understanding of being, he occasionally still takes *physis* in the sense of its verbal root as coming forth, presencing. In those cases the fabricative viewpoint of “making present” recedes behind emergence into presence – behind the presencing of plants as well as of handiwork. In such texts the distinction between two types of *arché* disappears because the kinetic pre-understanding of nature disappears. The word *arché* does not occur in the passages where *physis* recalls the verb *phyein*, “presencing” or “coming to presence” [Schürmann 1987, 101].

It is at this point that the decisive step is taken: *physis*, then, is by no means the place of a kinetic *arché*, because, conceived in this way, the latter becomes explicable only in contrast to the poietic process of the *téchne onta*. What needs to be deconstructed is the idea that nature has to do with “origin”, that *physis* constitutes the absolute plane of the *arché*. What we have to do is to deconstruct the conceptual connection between *nature* and *originariness*. What comes to mind here is the idea of an “*an-archy*” of nature, the possibility of a radical contestation of the idea that *physis* has, in general, to do with *arché*. The appearance of the entity cannot be described as a “being manufactured” by *physis*: that emergence from the «isotropic background of non-being» must be thought of as a mild appearance, a rising, a silent and mysterious *dehiscence*. A more essential determination of the genesis of the entity – and its form – therefore passes through the radical contestation that there is in *physis* any point of “dominance”, of principle, of command, of beginning. From a morphological point of view, there are no beginnings in nature. The *kinesis* of Being, the installation of matter in the shape of form, has no other aspect than that of a self-unfolding, of a mild and solitary ontological dawn:

For the pre-Attic mode of thinking, it seems, the origin appeared as simple presencing, as coming to presence, and in that sense as an-archic. If “presencing,” “coming about,” “emerging” (*genesis*) are the words that best describe the origin in its pre-metaphysical sense, it can only elude all representations connected with the *arché* of things in motion. It is dislodged from the site of maneuverable objects. Regarding its two classical features, inception and domination, the first can be seen as an echo of presencing; but with Heidegger’s return to pre-classical thinking, the notion of domination loses its central place in philosophy [Schürmann 1987, 104].

What, then, is nature without command? What, then, is *physis*, deprived of its essential connection with *arché*? In short, how should the idea of an *anarchic nature* be understood? What then is the relevance of this theme for a metaphysical foundation of morphology? Morphology, we have said, is that discipline of form that can ignore the difference between nature and art, because it studies the pure articulation of the *morphé*, regardless of whether it is “embodied” in a natural entity or in an artistic/artificial one. This is where, in some way, the initial hypothesis is verified. Morphology is a “science” that studies the form, regardless of the fundamental difference inscribed in the *kinesis* of the entity or abolishing the relevance of the distinction between *physei onta* and *téchne onta*. But this “abolition” is not a mere theoretical move: it is the new *anarchic* determination of *physis* that undermines the legitimacy of a natural discourse on *arché*. If *physis* is already “anarchic”, therefore not essentially graspable as a pure “archaic” matrix of universal becoming and transformation, morphology will no longer be just a mere theory of form, a mere phenomenology of forms and their metamorphoses. Here, morphology is the supreme science, which captures the link between life and art through the cognitive crystal of form, regardless of the kinetic archeology of universal becoming. It is therefore clearer now, in what sense morphology, far from being a mere descriptive science of the formal configuration of entities, becomes the knowledge of absolute *kinesis*. However, in this sense, it becomes the science of an “anarchic” *kinesis*, of a *kinesis* no longer indebted – and eternally insolvent – to a “principle” that “commands” its genesis and its form.

Morphology is the science that gives reason to the pure configuration of everything that exists, to the phenomenal carving out of everything that is “detached” from the depths of the indistinct. Morphology is the science of a life crossed by the pure need for form. This need cannot be explained by any other “theory”, if not as an inexplicable dehiscence of form, as an infinite “artistic” gift that nature gives to itself.

## References

- Agamben, G. [1998], *Homo sacer*, transl. D. Heller-Roazen, Stanford (CA), Stanford University Press.
- Agamben, G. [1999], *The Man without Content*, transl. G. Albert, Stanford (CA), Stanford University Press.
- Agamben, G. [2003], *The Open. Man and Animal*, transl. K. Attell, Stanford (CA), Stanford University Press.
- Aristotle [1908-1952], *Physics*, in: *The Works of Aristotle*, ed. W.D. Ross, Oxford (UK), Clarendon Press.
- Benjamin, W. [1972], *Neues von Blumen*, in: Id., *Gesammelte Schriften*, vol. 3. Frankfurt am Main, Suhrkamp, 151-152. (Original work published 1929)
- Blossfeldt, K. [1928], *Urformen der Kunst. Photographische Pflanzenbilder*, Berlin, Wasmuth.
- Blumenberg, H. [2013], *Ästhetische und metaphorologische Schriften*, ed. Haverkamp, Frankfurt am Main, Suhrkamp.
- Blumenberg, H. [2015], *Schriften zur Technik*, Frankfurt am Main, Suhrkamp.
- Caillois, R. [1960], *Méduse et Cie*, Paris, Gallimard.
- Di Napoli, G. [2011], *I principi della forma*, Torino, Einaudi.
- Figal, G. [2010], *Objectivity*, transl. T.D. George, Albany (NY), SUNY Press.
- Goethe, J. W. [2000a], *Hamburger Ausgabe*, vol. 1. München, Deutscher Taschenbuch Verlag.
- Goethe, J. W. [2000b], *Hamburger Ausgabe*, vol. 13. München, Deutscher Taschenbuch Verlag.

- Goethe, J. W. [2009], *The Metamorphosis of Plants*, Cambridge (MA), MIT Press. (Original work published 1790)
- Haeckel, E. [1904], *Kunstformen der Natur*, Leipzig/Wien, Bibliographisches Institut.
- Heidegger, M. [1998], On the Essence and Concept of φύσις in Aristotle's *Physics* B, 1 (1939), in: Id., *Pathmarks*, transl. W. McNeil, Cambridge (UK), Cambridge University Press, 183-230.
- Kant, I. [1974], *Kritik der Urteilskraft*, in: Id., *Werkausgabe*, vol. 10, ed. W. Weischedel, Frankfurt am Main, Suhrkamp. (Original work published 1790)
- Leghissa, G. [1998], *Le scienze diagonali di Roger Caillois*, in: R. Caillois, *L'occhio di Medusa*, Milano, Cortina.
- Mazzocut-Mis, M. [1995], *Gli enigmi della forma. Un'indagine morfologica tra biologia ed estetica a partire dal pensiero di D'Arcy Thompson*, Milano, Edizione dell'Arco.
- Mazzocut-Mis, M. [1997], *I percorsi delle forme. I testi e le teorie*, Milano, Bruno Mondadori.
- Pinotti, A., Tedesco, S. (eds.) [2013], *Estetica e scienze della vita*, Milano, Cortina.
- Schürmann, R. [1987], *Heidegger on Being and Acting: From Principles to Anarchy*, Indiana (IL), Indiana University Press.
- Tedesco, S. [2010], *Morfologia estetica*, Palermo, Aesthetica Preprint.
- Vercellone, F., Tedesco, S. (eds.) [2020], *Glossary of Morphology*, Cham, Springer.

## Keywords

Morphology; Form; *kinesis*; Art; Life

## Abstract

The aim of this article is to rethink the indispensable connection between aesthetics and life sciences. According to a consolidated tradition, the fundamental point of intersection between the two disciplines is represented by the concept of form. It is

therefore to morphology that the task of thinking about the *nature of form* and the *form of nature* is ascribed. In this sense, Goethe and the debates on morphology arising from his texts represent an essential speculative starting point. However, the Goetheian teaching is, in this context, even more compelling, because morphology is already configured as a science of form that suspends the kinetic difference between natural and artificial beings, between nature and art/technique. If nature, *physis*, has still been thought of by Aristotle as the realm of *arché*, it will be a question of comprehend how, through the testimony of Heidegger and Schürmann, it is possible to metaphysically found morphology by understanding the essential “anarchic” character of nature.

Pier Alberto Porceddu Cilione  
University of Verona  
E-mail: [pieralberto.porcedducilione@univr.it](mailto:pieralberto.porcedducilione@univr.it)

## MARKUS OPHÄLDERS

GENIALE ÜBERSETZUNGEN.  
GOETHE – BENJAMIN – SPENGLER

Die Morphologie oder Metamorphose setzt sich aus Prozessen der Forschung, des Wissens und der künstlerischen ebenso wie der begrifflich-theoretischen Schöpfung auf der Grundlage einer Übersetzungspraxis zusammen, welche ein Analogon zur Kantischen Definition des Genies darstellt: «angeborene Gemütsanlage (*ingenium*), durch welche die Natur der Kunst die Regel gibt» [Kant 1998, Bd. 5: *Kritik der Urteilskraft*, 405-406]. Insbesondere die Goethesche Metamorphose stellt in diesem Sinne eine Bewegung des unaufhörlichen sich Selbstübersetzens in anderes dar und diese Bewegung beruht auf der genialen Kraft der Natur bzw. der natürlichen Kraft des Genies. Seine Art der metamorphischen Übersetzung, die es in erster Linie mit Naturphänomenen zu tun hat, bewegt sich jedoch noch in einem im Wesentlichen homogenen Bereich und kann als mimetisch bezeichnet werden. Dies gilt auch für ihre Rolle in künstlerischen Schaffensprozessen, die sich in vielen Dingen analog zu denen der Naturphänomene verhalten, worauf ja auch schon Aristoteles hingewiesen hat [vgl. Aristoteles, *Poetik*, 4, 1448b 4 f.].

Es wird jedoch komplizierter, wenn man versucht, die Morphologie als Forschungsverfahren in Felder zu übersetzen, die – vielleicht auch nur scheinbar – weiter entfernt liegen. Wiederum Aristoteles hat das Ethische und das Tragische in der Kunst einander gegenübergestellt; dies war möglich, weil in beiden Fällen das Zentrum des Problems durch Handlungen (*energeia*) dargestellt wird, die ethisch sein können, wenn sie sich aus dem Charakter des Individuums heraus ergeben und auf Glückseligkeit abzielen, oder tragisch, wenn externe Faktoren involviert sind, die nicht in der Macht derer liegen, die handeln [vgl. Aristoteles, *Die Nikomachische Ethik*, I, 8, 1099a f.]. Die Grundlage hierfür bildet auch für Aristoteles jedoch die Natur und ihre Produktions- oder Schöpfungsweisen, denen gegenüber ethische und tragische Handlungen

gen Analogien bilden bzw., wenn man es so ausdrücken möchte, Übersetzungen oder Nachahmungen. Auch in diesem Fall handelt es sich um eine mimetische Operation.

Welche Züge jedoch nimmt diese Konstellation an, wenn die Handlungen und die äußeren Faktoren allgemeiner werden und von der individuellen Ebene ethischer Personen oder tragischer Helden – obschon der substantiellen ethischen Werte, deren Träger sie Hegel zufolge jeweils sind [vgl. Hegel 1985: *Ästhetik*, Bd. 2, 548] – übergegangen wird zur universellen der Geschichte? Es ist bekannt, dass Aristoteles zufolge die Poesie philosophischer sei als die Geschichtsschreibung, weil sie sich im Universellen und Potentiellen bewegt und die Dinge so darstellt wie sie hätten sein können und nicht, wie sie realiter sind [vgl. Aristoteles, *Poetik*, 9, 1451a36 – 1451b10]. Im Falle einer Übersetzung der Morphologie und ihres Goetheschen Grundbegriffs des Urphänomens aus dem Bereich der Natur in den der Geschichte verwandeln jedoch die Beziehungen ihren mimetischen Charakter in einen logischen und schließlich in begriffliche Verhältnisse, weil Geschichte, zumal die moderne und zeitgenössische, nicht analogisch oder mimetisch mehr erfahrbar ist, sondern einzig durch kategoriale Erkenntnis. Hierin liegt die Wahrheit des Hegelworts, demzufolge man heute keine Poesie mehr betreiben könne, da die moderne, bürgerliche Welt zu abstrakt sei; heutzutage bedarf es der dialektischen Logik, der «Anstrengung des Begriffs» [Hegel 1999, Bd. 2: *Die Phänomenologie des Geistes*, 41]. Hierin nun aber liegt eine große Gefahr, denn die Form der Analogie – welche der logische Begriff für mimetische Ähnlichkeit ist – wird verlassen und man betritt den Bereich der begrifflichen Logik und der Rationalität. Von der Metapher, die es uns Aristoteles zufolge ermöglicht, das Ähnliche im Unähnlichen zu entdecken [vgl. Aristoteles, *Poetik*, 21, 1457b 11 f.], wird übergegangen zum rein logischen Prinzip der Identität. In diesem Übergang geht das logische Denken über die Metapher hinaus; es bleibt ihrer nicht mehr eingedenk, obschon eben sie Aristoteles zufolge weiterhin die grundlegende Möglichkeit einer jeden begrifflichen und verallgemeinernden Operation darstellt. Die schwere Artillerie des logischen Denkens besiegt mimetische, metaphorische und analogische Verfahrensweisen und lässt sie in Vergessenheit geraten; auf diese Weise löst ein solches Denken sich Schritt um Schritt von seinen eigenen Wurzeln und vergisst sie am Ende.



In den ersten Jahrzehnten des 20. Jahrhunderts verflocht sich der übersetzende und natürlich geniale Charakter von Goethes Morphologie mit zwei geschichtsphilosophischen Ansätzen, die beide beanspruchen, sich von ihm herzuleiten. Walter Benjamin übersetzt den Schlüsselbegriff der Goetheschen Morphologie – das Urphänomen – in einen der Grundbegriffe seiner Geschichtsphilosophie und seiner Ästhetik, und zwar den des Ursprungs, der später erneut übersetzt wird in den des dialektischen Bildes [vgl. Ophälders 2015, 54]. Oswald Spengler seinerseits lässt sich von der Goetheschen Naturphilosophie inspirieren und wendet diese dann auf die Geschichte an, wobei er die kulturellen Epochen als Pflanzen behandelt, die geboren werden, wachsen, reifen, verwelken und untergehen, wie am Ende auch das Abendland. Der Unterschied zwischen den beiden Ansätzen besteht allerdings darin, dass Benjamin – der nicht nur den Vorgaben Goethes, sondern auch denen Kants aus nächster Nähe folgt – mimetisch-analogisch übersetzt, während Spengler – mit allen Konsequenzen, die daraus entstehen – die bloße morphologische Methode in ihrer natürlichen Form begrifflich und logisch anwendet auf ein Objekt, das nicht mehr nur Natur ist. Auf diese Weise wird Geschichte als Naturphänomen behandelt. Ein Gegenstand, der immer auch das Ergebnis menschlicher Operationen und Taten ist, die vom Bewusstsein geleitet werden, und der eben deswegen nicht mehr nur von Naturnotwendigkeiten bestimmt wird, sondern, wie Hegel sagt, «Fortschritt im Bewusstsein der Freiheit» ist [Hegel 1955: *Vorlesungen zur Philosophie der Weltgeschichte*, Bd. 1, 68], wird rückverwandelt in Natur.

Bezeichnenderweise tritt gerade Hegel, der dem Übersetzen im Gegensatz zu seinen romantischen Zeitgenossen scheinbar wenig Aufmerksamkeit schenkt, auf einer tiefer liegenden Ebene – eben der der Formwerdung, die man ohne weiteres auch Morphogenese nennen könnte – als Übersetzungsgenie hervor. Von Aristoteles übernimmt er den Ansatz, alles auf seine Form (*morphe*) hin zu erforschen und in der Folge darauf zu sehen, wie diese jeweilige Form sich in immer wieder neue Formen übersetzt. Hierbei nimmt er das Lateinische *trans-ducere*, wie dies häufig bei ihm geschieht, beim Wort und führt die jeweiligen Formen oder Phänomene dialektisch durch, wie Beethoven dies musikalisch in seiner klassischen Periode auch tut. Die Zentrierung

des Denkens auf die Form und die gleichzeitige dialektische – wohl-gemerkt nicht formal-logische – Begrifflichkeit stellen denn auch die Idee der Phänomenologie dar, eine nicht nur vernünftige oder systematische Denkweise, sondern eine gleicherweise organische und vitale, welche den etymologischen Ursprung des Begriffs Theorie als Beobachtung und Kontemplation akzentuiert und sie als «reines Zusehen» [Hegel 1999, Bd. 2: *Phänomenologie des Geistes*, 59] charakterisiert, was der Goetheschen «zarten Empirie» [Goethe 2000, Bd. 12: *Maximen und Reflexionen*, 435] äußerst nahekommt. Was erscheint, ist, was die jeweilige Form seiner Erscheinung darstellt, denn der sich bildende Geist ist auf jeder seiner Stufen immer nur das, dem er seiner jeweiligen Gestaltungskraft gemäß eine entsprechende phänomenische Form zu geben im Stande ist.

Goethes kurze Schrift *Die Metamorphose der Pflanzen* [Goethe 2000, Bd. 13, 64 f.] enthält eine klare und umfassende Darstellung der morphologischen Methode, die er für seine Erforschung der Natur entwickelt. Durch seine Untersuchungen will Goethe die Urphänomene bzw. jene Phänomene entdecken, die es – obwohl sie eine durch die Sinne wahrnehmbare phänomenische Erscheinung sind – ermöglichen, einen Blick auf die ursprüngliche Form zu werfen, aus der alle existierenden Formen herkommen. Hinsichtlich der Botanik bezeichnet Goethe dieses Urphänomen zunächst durch den Begriff der Urpflanze. Es soll sich hierbei nicht um eine platonische Idee handeln, die als Phänomen oder *eidolon* erscheint, jedoch als Idee niemals wirklich erfahrbar ist. Goethe ist in der Tat davon überzeugt, dass eine solche Urpflanze in der Natur existiert, d.h. dass ihre Form in den Naturphänomenen sinnlich erfahren werden könne. Er ist davon sogar so sehr überzeugt, dass er glaubt, sie auf seiner Reise nach Italien in den Botanischen Gärten von Padua und Palermo erblickt zu haben [vgl. Goethe 2000, Bd. 3: *Geschichte meiner botanischen Studien*, 164; vgl. ebenfalls Barbetta 2000, 286].

Zurück in Weimar trifft er sich mit Schiller, dem er von seinen Forschungen und Entdeckungen erzählt, und dieser antwortet ihm sehr kantisch, dass das, wonach er suche und was er meine gesehen zu haben, nicht in der Natur zu finden sei, weil es sich im kantischen Sinne um eine übersinnliche Idee handle. Nicht ohne einen gewissen unwir-schen Ton antwortet Goethe ihm, dass er sehr erfreut darüber sei, eine

Idee im Kopf zu haben und sie gleichzeitig überall in der Natur sinnlich wahrnehmen zu können [vgl. Goethe 2000, Bd. 10: *Glückliches Ereignis*, 538 f.]. Schillers Kritik jedoch bleibt nicht ohne Folgen: Goethes morphologische Grundkonzeption bleibt erhalten, aber in der Terminologie der endgültigen Fassung der *Metamorphose der Pflanzen* wandelt sich etwas. In der Tat erscheint der Begriff Urpflanze nicht mehr, den er durch den des Blatts ersetzt. Goethe lehnt denn auch die Idee ab, dass hinter den sichtbaren Phänomenen noch etwas anderes stecke, ein Wesen oder eine Idee, die niemals durch die sinnliche Wahrnehmung erfahren werden könne. Was die Botanik betrifft, lautet allerdings die Grundannahme jetzt: Alles ist Blatt.<sup>1</sup>

Der Urpflanze gegenüber, die Kant zufolge ein *Noumenon* ist, stellt das Blatt ein Phänomen dar; das Blatt dehnt sich aus und zieht sich zusammen, wodurch es den jeweiligen Erscheinungen eine Form (*morphe*) verleiht, die jedes Mal eine andere (*meta*) ist, einem hypothetischen Originalblatt jedoch durchweg ähnelt. Dieses Blatt bzw. diese Urpflanze kann nicht direkt sinnlich wahrgenommen werden und doch ist sie in jeder botanischen Erscheinung erkennbar; sie stellt das Ähnliche im Unähnlichen dar und begründet eine analogisch-mimetische, anschauliche Denkweise, welche in der Form der jeweiligen Erscheinungen begründet ist. Jeder einzelne Teil einer jeden Pflanze stellt ein Beispiel dar, eine analoge und intuitive Variation eines Modells, das als solches nicht erscheint, tatsächlich jedoch in allem vorhanden ist, was zu sehen ist.

Hierbei ist es interessant zu beobachten, dass Kant auf fast dieselbe Weise das ästhetische bzw. das Geschmacksurteil definiert, welches ein reflektierendes ist: «Vom Schönen [...] denkt man sich, daß es eine *notwendige* Beziehung auf das Wohlgefallen habe. Diese Notwendigkeit nun ist von besonderer Art: [...] sie kann als Notwendigkeit, die in einem ästhetischen Urteile gedacht wird, nur *exemplarisch* genannt werden, d.i. eine Notwendigkeit der Beistimmung *aller* zu einem Urteil, was wie Beispiel einer allgemeinen Regel, die man nicht angeben kann,

---

<sup>1</sup> In einem gewissen Sinne kommt Goethe, wenn auch in sehr viel ausdifferenzierter Form, auf eine seiner Grundideen zurück, die er im April 1787 während seiner Italienischen Reise in seinem Tagebuch notierte: «Hypothese: alles ist Blatt. Und durch diese Einfachheit wird die grösste Mannigfaltigkeit möglich» [Goethe 1987, II. Abteilung, Bd. 7, 282; vgl. Goethe 2000, Bd. 13, 576].

angesehen wird» [Kant 1998, Bd. 5: *Kritik der Urteilskraft*, 319-320]. Auch das Schöne, und das genial Schöne zumal, wird bekanntlich als Erscheinung bezeichnet, deren Regel nicht gegeben werden kann [vgl. Kant 1998, Bd. 5: *Kritik der Urteilskraft*, 310 f. und 406].

Das Urphänomen ist Goethe zufolge das, was für das Genie in seiner Kantischen Definition diese unbestimmte Regel der Natur ist. Wie findet nun allerdings die geniale Tat bzw. die Übersetzung dieser Regel, die von der Naturphilosophie oder Morphologie entdeckt wurde, in Kunst und Kunstphilosophie statt? Wie kann das von Goethe entdeckte Naturgesetz der Kunst die Regel geben? Und wie könnte in Folge dieser mimetischen Übersetzung eine solche Naturgesetzlichkeit eventuell in eine logisch-begriffliche Methode übersetzt werden, welche auch abstraktere Phänomene, wie das der Geschichte in Angriff nehmen könnte? In diesem Zusammenhang lohnt es sich, einen Auszug aus dem Kapitel «Dunkle Galerie» des 2. Teils von *Faust* zu lesen [Goethe 2000, Bd. 3, 191-193, vv. 6212-6289]. Mephistopheles schickt Faust in das Reich der Mütter, um die Vorbilder oder Modelle aller Schönheit bzw. deren Urphänomene von der Antike in die Moderne zu übertragen bzw. zu übersetzen, und zwar Helena und Paris.

MEPHISTOPHELES. Ungern entdeck ich höheres Geheimnis. –  
Göttinnen thronen hehr in Einsamkeit,  
Um sie kein Ort, noch weniger eine Zeit;  
Von ihnen sprechen ist Verlegenheit.  
Die Mütter sind es!

[...]

MEPHISTOPHELES. Versinke denn!  
Ich könnt auch sagen: steige!  
’s ist einerlei. Entfliehe dem Entstandnen  
In der Gebilde losgebundne Reiche!

[...]

MEPHISTOPHELES. [...] Bei seinem  
Schein wirst du die Mütter sehn:  
Die einen sitzen, andre stehn und gehn,  
Wie’s eben kommt. Gestaltung, Umgestaltung  
Des ewigen Sinnes ewige Unterhaltung  
Umschwebt von Bildern aller Kreatur [...]

Die Mutter, das natürliche schöpferische Prinzip menschlichen Lebens und immer auch die individuelle Mutter eines jeden einzelnen, wird hier zum universellen schöpferischen Prinzip natürlichen Lebens, nicht unähnlich der Weise, in der Goethe das Urphänomen auffasst. Allerdings ist die «Dunkle Galerie» nicht auf dem kreativen Prinzip einer Mutter allein aufgebaut, sondern auf dem einer Vielzahl von Müttern, und dies verschiebt die Akzente und ändert die Bedeutungen, auch wenn zunächst sowohl der Grund wie auch die Richtung dieses Wandels verborgen bleiben.

Schon aus einer rein technisch-sprachlichen Sicht heraus ist jedoch bemerkenswert, dass Goethe hier wie die Natur handelt, d.h. er wendet das natürlich-ökonomisches Prinzip des kleinstmöglichen Energieaufwands an. Mit einem äußerst winzigen Eingriff – nämlich durch die alleinige Hinzusetzung des Umlauts – verwandelt er den üblichen Singular «die Mutter» in den geheimnisvollen und rätselhaften Plural «die Mütter». Der sprachlich-poetische Eingriff, die minimale Übersetzung eines Singulars in einen Plural ist umso außergewöhnlicher und genialer, als es Goethe gelingt, mit dieser winzigen Intervention die maximale Wirkung zu erzielen. Im Deutschen bleibt nämlich nicht allein das Substantiv im Singular und im Plural nahezu identisch, sondern auch der weibliche Singular- und der Pluralartikel bleiben sich gleich. Goethe muss daher nur den Umlaut hinzusetzen, d.h. das «u» in «ü» umwandeln, und die Operation ist abgeschlossen; in der deutschen Sprache ist dies die sachtteste Form von metamorphischer Wandlung, doch im Falle der Mütter ist ihre Wirkung die größte und Fausts Reaktion hierauf spiegelt dies denn auch vollständig wider. In dem Mann Faust weckt die bloße Aussprache des Wortes «Mütter» nicht nur Schrecken und am Ende Begeisterung, sondern ebenfalls das wohlbekannte Staunen bzw. das Schaudern, womit Goethe das griechische *thaumazein* übersetzt, das in der Konfrontation mit Rätseln und Geheimnissen entsteht und das Vorbote vollkommen neuer Erfahrungen ist: «Doch im Erstarren such ich nicht mein Heil, | Das Schaudern ist der Menschheit bestes Teil» [Goethe 2000, Bd. 3: *Faust II*, 193].

Ein Zeichen aus der gewohnheitsmäßigen Welt natürlicher Erfahrungsweisen wird verfremdet und öffnet den metaphorischen Raum für neue Bedeutungen: Die mit der natürlichen Schöpfung verbundene an-

schauliche Bedeutungssphäre wird gerettet, doch wird sie überlagert von der Sphäre künstlerischer und symbolischer Bedeutungen. In der Tat sind die Mütter nicht wie jede natürliche Mutter von ihren eigenen Kreaturen umgeben, sondern von den Bildern aller Kreatur, von Bildern des Lebens und nicht von wirklichen Lebewesen. In derselben Weise behauptet Kant, dass die Kunst keine schönen Dinge schaffe, sondern schöne Vorstellungen von Dingen [vgl. Kant 1998, Bd. 5: *Kritik der Urteilskraft*, 410], eben Bilder aller Kreaturen. Darüber hinaus sind die Mütter immer in Bewegung, in ständiger Gestaltung und Umgestaltung, in einer unaufhörlichen Metamorphose des ewigen Sinnes: Sie sind weder der Zeit noch dem Raum unterworfen, sie sind überall und nirgends, genau wie das Blatt, die Urpflanze der *Metamorphose der Pflanzen*. Um Faust die Richtung zu weisen, sagt Mephistopheles ihm denn auch, dass er ebenso hinabfahren wie auch aufsteigen könne, es sei einerlei: Es gibt keinen auserwählten Ort für das Wesen; hinter dem Phänomen ist nichts Weiteres verborgen. In dem Phänomen, sowohl dem natürlichen als auch dem künstlerischen, ist alles zu finden und deshalb ist in der Welt die Idee zu finden und in der Idee als Phänomen die Welt.

Mit wenigen Attributen, wie es das Naturgesetz des kleinstmöglichen Energieaufwands vorsieht, charakterisiert Goethe die Mütter nicht nur als Urphänomene, sondern auch als einsame Göttinnen, ähnlich den neun Musen, und findet so eine Synthese – um nicht zu sagen eine Übersetzung – nicht nur zwischen der Naturphilosophie und der Kunstphilosophie, sondern auch zwischen Antike und Moderne, wie es am Ende der Tragödie in der «Klassischen Walpurgisnacht» in großem Stil in Szene gesetzt wird. Was in der Natur die Urphänomene sind, wird in der Kunst von den Müttern dargestellt. Diese Beziehung ist jedoch alles andere als linear; das Geniehafte besteht in der Form der Übersetzung der Naturregel in die Kunstregel und nicht, wie es in den Naturwissenschaften der Fall ist, in der einfachen Anwendung eines Naturgesetzes auf bestimmte Phänomene. In der Tat ist das Übersetzen denn auch niemals eine lineare Operation, sondern beinhaltet immer auch Verschiebungen, Interpretationen, subjektive Eingriffe und manchmal so-

gar Verrat.<sup>2</sup> Im Gegensatz zur simplen Übertragung oder Anwendung derselben Regel von der natürlichen auf die künstlerische Sphäre geht es vielmehr um Übersetzung und um die Schaffung einer Analogie. Die Regel des Naturwissenschaftlers ist denn auch immer eine bestimmte und für die Phänomene, auf welche sie angewendet wird, bestimmende; die des Künstlers ist unbestimmt. Ein weiterer Unterschied ist, mit Proust zu sprechen, der, «daß bei dem Naturwissenschaftler die Arbeit des Verstandes vorausgeht, bei dem Schriftsteller aber folgt» [Proust 2002, 278]. Der Künstler arbeitet nicht auf eine ähnliche Weise wie der Wissenschaftler, weil er dieselbe Regel anwendet, sondern insofern er zwischen seiner eigenen Kreativität und den Materialien und Formen, mit denen er verfährt, ähnliche – aber nicht gleiche – Beziehungen herstellt, welche denen zwischen der Regel und den Phänomenen in der Natur gleichen. Es gibt denn auch keine Analogien zwischen Dingen, sondern nur zwischen Beziehungen, weil wir die Dinge nicht an sich erkennen können, sondern nur unsere Beziehungen zu ihnen oder ihre Beziehungen untereinander; auch hier jedoch wiederum einzig durch unsere Vermittlung hindurch.

Auch in der Kunst also gibt es für Goethe Archetypen und Modelle, denen die Werke «ähneln» müssen. Bezugspunkt seiner Theorie ist denn auch nicht die Idee der Kunst, die sich auf die Form konzentriert, sondern das Ideal, das vom Inhalt abhängt. So wie die Mütter von den Bildern aller Kreatur umgeben sind, stellt auch das Ideal der Kunst die Einheit einer begrenzten Vielfalt reiner Inhalte dar, die letztendlich mit den neun Musen vergleichbar ist. Für Goethe ist Kunst nicht selbst die Schöpferin ihrer Archetypen oder Modelle; in der Tat gehen ihr diese Archetypen nämlich voraus, denn sie stammen aus jener Sphäre, in der Kunst eben Natur ist. In diesem Sinne untersucht Goethe die Natur, er will ihre Idee erfassen, um sie dann in Kunst umzusetzen. Als Musen schaffen die Mütter von daher lebendige Bilder natürlicher Geschöpfe, aber sie selbst sind geistige Kreaturen, Erzeugnisse von Übersetzung und Reflexion und allein auf diese Weise Symbole, Allegorien und Metaphern künstlerischer Kreativität.

---

<sup>2</sup> Vgl. im Italienischen *tradurre* (übersetzen, von lat. *trans* und *ducere*, im engeren Sinne: weiterführen, weiterleiten) und *tradire* (verraten, von lat. *trans* und *dare*, im engeren Sinne: weitergeben).



Nicht im ewigen Werden, in der schöpferischen Bewegung im Formmedium liegt nach Goethes Auffassung der Urquell der Kunst. Die Kunst selbst schafft nicht ihre Urbilder – diese beruhen vor allem geschaffenen Werk in derjenigen Sphäre der Kunst, wo diese nicht Schöpfung, sondern Natur ist. Die Idee der Natur zu erfassen und sie damit tauglich zum Urbild der Kunst (zum reinen Inhalt) zu machen, das war im letzten Grund Goethes Bemühen in der Ermittlung der Urphänomene [Benjamin 1980, Bd. I.1: *Der Begriff der Kunstkritik in der deutschen Romantik*, 112].

Für Goethe bleibt dieses Ideal einer ursprünglichen Kreativität der Natur jedoch getrennt von den Phänomenen, die es erzeugt; die Urbilder bleiben einerseits isoliert voneinander und andererseits gibt es keinen direkten Übergang zwischen dem Natürlichen und dem Ideal der Kunst. Jedes Kunstwerk ist Darstellung einer Übersetzung des natürlichen Inhalts eines Archetyps und keines kommuniziert mit den anderen, da die Werke, wie die Mütter, hehr in Einsamkeit thronen; den Archetypen (Urbildern) können sie einzig gleichen und das einzelne Werk bleibt getrennt vom Ideal der Kunst als solchem, welches eben in seinem Ursprung Natur ist. Die Analogien zu Spenglers Morphologie sind offensichtlich, obwohl ein Unterschied bestehen bleibt: Goethe zufolge kommt in der künstlerischen Form ein Ideal zum Ausdruck, das jeder künstlerischen Erschaffung vorhergeht und dem die Werke jedes Mal eine andere Darstellung verleihen, die niemals das gesamte Ideal darstellt, ihm jedoch ähnelt, da das einzelne Werk notwendigerweise von den Sinnen wahrgenommen werden muss. Spengler seinerseits jedoch vertilgt alle Ideale und verfolgt einzig das, was er für den tatsächlichen Ablauf der Geschichte hält und den er dahingehend interpretiert, dass er auf Untergang hin angelegt ist.

Wenn Kunst – und mit ihr zusammen Kultur als solche – durch einen Prozess der Übersetzung entsteht,<sup>3</sup> der von den natürlichen Ur-

---

<sup>3</sup> Es ist in diesem Bezug notwendig hinzuweisen darauf, dass der Terminus Kultur sich herleitet aus dem der Agrikultur und dass zudem der der Version, welcher nicht allein Interpretation, sondern weiter gefasst eben auch Übersetzung bedeutet, abstammt vom lat. *vertere* (drehen, wenden, verändern), welches auch benutzt wurde für: Erde aufwerfen bzw. umpflügen, d.h. Tätigkeiten oder Rituale, die in der Antike



phänomenen seinen Ausgang nimmt, dann ist die Übersetzungspraxis auch Grundlage der Kulturgeschichte. Gerade weil das Ideal der Kunst qua Natur nie vollkommen übersetzt werden kann in Kunst und Kultur, ist immer wieder von neuem diese Übersetzungspraxis vonnöten. Allgemeiner gesagt ist für Goethe das Übersetzen gleichbedeutend mit der Metamorphose von einer Kultur in eine andere, und eben dies schließt Spengler allerdings aus. In diesem Bezug kommt erneut das ganze Gewicht dessen zum Tragen, was es mit dem Übersetzen auf sich hat. Der Übersetzer Benjamin hat denn auch in dieser für alle kulturbildende Arbeit grundlegenden Tätigkeit das Wesen von Erfahrung gesehen. Das innerste Prinzip in Goethes *West-östlichem Divan* ist denn auch – wie bekannt – eine solche Verständigung zwischen Kulturen, eine Verständigung, deren Hauptbestandteile Mitteilung, Übersetzung, Interpretation und Aufnahme von fremdem Kulturgut sind. Übersetzen bedeutet nämlich Gestalten, Umgestalten, Analogien schaffen, Ähnliches in Unähnlichem erscheinen zu lassen und nicht zuletzt lebt sie von einem Impuls zur Rettung. Für Benjamin ist es sogar einzig und allein die Übersetzbarkeit von poetischen Texten, die ihr Überleben garantieren können. Unübersetzbare Ausdrucksformen sind schon tot, bevor sie wirklich beginnen zu sprechen; gleiches mag von den Kulturen gelten. Eine Übersetzung, die Einrichtung eines Museums, aber eben auch Geschichtsschreibung sind immer eine Verwandlung und Übersetzung von Vergangenen in Gegenwärtiges und das bestimmt die jeweilige gegenwärtige Form, welche das Vergangene annimmt. Dabei wandelt sich nicht allein die Form des Vergangenen, sondern gleichfalls wird dadurch auch die Gegenwart verwandelt. Diese vergangene Form ist somit nicht nur im analogen, von Spengler deutlich gesehenen Sinne «gleichzeitig», sie ist ebenso wohl und als durchgeführte Übersetzung auch dialektisch durchkonstruiert und bedarf aufgrund ihrer Substanz, die im Werden liegt, immer wieder von neuem der Wiederholung, welche allerdings – wie in der Musik, die nichts Identisches kennt und die im Medium der Übersetzung lebt wie keine andere Kunst – variierende Entwicklung ist, ein vielschichtiges dialektisches Spiel zwischen Gedächtnis und Vergessen, Kreation und Destruktion, deren Erschei-

---

auch bei der Städtegründung eingesetzt wurden [vgl. Rykwert 1976].

nungsformen echohaftes Wiederhallen, Verklingen und in verwandelter Form Wiedererklingen sind.

Was nun Spenglers Auffassung von Untergang betrifft, so sterben auch Kulturen und Zivilisationen, wie die Pflanzen, erst dann, wenn sie die Kraft zur Wandlung und Übersetzung und Anverwandlung verlieren. Goethe hat dies anhand der Sprachen einmal folgendermaßen formuliert: «Die Gewalt einer Sprache ist nicht, daß sie das Fremde abweist, sondern daß sie es verschlingt» [Goethe 2000, Bd. 12: *Maximen und Reflexionen*, 508]. Das wohl bekannteste Gedicht aus dem *Divan*, die *Selige Sehnsucht* bringt den Trieb des Rettens folgendermaßen auf den Punkt: «Stirb und werde» [Goethe 2000, Bd. 2: *Westöstlicher Divan*, 19], also nicht: Stirb und gehe unter, wie Spengler formulieren würde. Auch bei Goethe ist zwar ein apokalyptischer Nebenton vernehmbar, den Francesco De Sanctis, dessen Ohr für Goethe stets offen gewesen ist, mit folgenden Worten zum Ausdruck bringt: «*Chi non ha la forza di uccidere la realtà, non ha la forza di crearla*»<sup>4</sup> [De Sanctis 1996, 160]. Neue Form und tote Form greifen ständig ineinander, wenn es um geistige, produktive Arbeit geht. Das rezipiert Hegel in seinem Begriff der Aufhebung, der ja nicht nur eine Erhebung darstellt und ein Außerkraftsetzen, sondern ebenso ein Konservieren des Aufgehobenen, des Toten, dem man ins Angesicht geschaut hat, um sich selbst in der absoluten Zerrissenheit – ähnlich, aber auch wiederum durch die gemachte Erfahrung anders – wiederzuerkennen [vgl. Hegel 1999, Bd. 2: *Phänomenologie des Geistes*, 27]. Ein Selbiges findet sich ebenso bei Goethe, wenn er im *Divan* von der «Nachbildung» spricht, die gerade in Bezug auf die kulturelle Operation, die er mit dem *Divan* durchführen will, als eine Metamorphose der Übersetzungspraxis bezeichnet werden kann, welche den Untergang mit einem Neubeginn verbindet. Apokalypse als Metamorphose und dialektischer Umschlag durch den Untergang hindurch, der immer auch Aufgang anderswo bedeutet [vgl. Jünger 1980-1983, Bd. 8: *Adnoten zum Arbeiter*, 321]: «Selbst der Geist erscheint sich nicht erfreulich, | Wenn er nicht, auf neue Form bedacht, | Jener toten Form ein Ende macht» [Goethe 2000, Bd. 2: *Westöstlicher Divan*, 24]. Übersetzungen jedoch retten keineswegs nur Texte, sondern

---

<sup>4</sup> «Wer nicht die Kraft dazu hat, die Wirklichkeit zu töten, hat auch nicht die Kraft, sie zu erschaffen».

durch sie hindurch vielmehr noch ganze Kulturen vor dem Untergang ihrer Sprachen und Ausdrucksformen; Goethe verweist diesbezüglich auf Voßens Homerübertragung; man könnte auch auf Hölderlins Übersetzungen Pindars oder Sophokles' verweisen. In diesen Übersetzungen geht es nicht um die Vermittlung oder Kommunikation von Kultur, welche in ihrer Originalsprache unzugänglich bliebe, es geht um ihr Überleben, welches natürlich auch reflexiv ein sich Überleben ist, ein Überleben, das gleichzeitig ihr Fortleben, mehr jedoch noch ihr Aufleben bedeutet [vgl. Goethe 2000, Bd. 2: *Westöstlicher Divan*, 126-28; Benjamin 1980, Bd. IV.1: *Die Aufgabe des Übersetzers*, 9 f.].

Spenglers Begriff des Untergangs jedoch klammert eben gerade die Momente der Vermittlung und Übersetzung, ja selbst die Metamorphose aus. Ihm zufolge ist die Darstellungsweise seiner Geschichtsphilosophie weitgehend die von Goethes künstlerischer Vorgehensweise, doch ist der Inhalt kein Ideal, denn er besteht aus den bloßen historischen Tatsachen, so wie sie sich wirklich scheinen zugetragen zu haben. Historische Formen sind für Spengler eben keine bewussten Konstruktionen, sondern Formen natürlichen Lebens, und als solche gilt für sie der Vers: «geprägte Form, die lebend sich entwickelt» [Goethe 2000, Bd. 1: *Die weltanschaulichen Gedichte*, 359], womit Goethe in dem berühmten Gedicht *Urworte-orphisch* den aristotelische Begriff der *entelecheia* übersetzt. Dieser Vers schließt die mit *Daimon* betitelte Strophe und bezieht sich in der Tat auf die Existenz eines natürlichen Lebens, von dem Goethe jedoch das geschichtliche radikal unterscheidet. Die Strophe, welche auf die dem Schicksal gewidmete folgt und welche die ganze Dichtung abschließt, trägt denn auch den bezeichnenden Titel *Elpis*, Hoffnung. Diese Strophe widersetzt sich unmittelbar der vorangegangenen und öffnet metaphorisch die Pforte der Freiheit in der antiken Mauer des natürlichen Schicksals, wobei sie die Grenze, welche Natur und Geschichte trennt, überschreitet. Dies tut sie dialektisch, indem die Grenze nicht einfach eliminiert, sondern in einem quasi Hegelschen Sinn aufgehoben wird und das bedeutet, dass sie zwar überwunden, aber immer auch in gewandelter Form, d.h. als in der Erfahrung sedimentiertes Moment beibehalten wird. Das Schicksal, so die Dichtung, hat einzig die alte Dauer eines Felsens, des untersten Teiles der natürlichen Hierarchie; das neue Wesen indessen bewegt – leicht und regellos

– sich schnell und gewandt: «Ein Flügelschlag – und hinter uns Äonen!» [Goethe 2000, Bd. 1, 360]. Zwischen Schicksal, einem von Spenglers Schlüsselbegriffen, und Hoffnung, mit der das Gedicht endet, gibt es für Goethe keine Übereinstimmung, im Gegenteil: Ihre Beziehung ist die dialektische, in der der Naturnotwendigkeit die menschliche Freiheit entgegengesetzt ist.

Wenn in Spenglers Geschichtsphilosophie die Tatsachen den Inhalt darstellen, dann ist die morphologische Methode mit ihren Begriffen von Seele, Symbol, Mythos, Schicksal, Stil, Kultur und Zivilisation ihre Form. Der Inhalt besteht daher aus Geschichte und die Form aus Natur. Aus dem natürlichen Bereich übersetzt Goethe die Morphologie in eine künstlerische Vorgehensweise und als höchster Ausdruck entstehen hieraus die faustischen Mütter. Der Unterschied zwischen Goethe und Spengler ist jedoch nicht allein der unterschiedliche Bereich, in dem die Morphologie zur Anwendung gebracht wird, die Kunst für den einen, die Geschichte für den anderen; die beiden Autoren unterscheiden sich auch in der Art, in der sie sie auf die jeweiligen Bereiche übertragen: Goethe übersetzt, Spengler wendet an. Je mehr letzterer versucht, durch den Gegensatz zwischen Gewordensein und Werden [Spengler 1983, 127] die Methode vom Natürlichen auf das Geschichtliche zu übertragen, desto mehr schlagen die Eigenschaften des einen dialektisch um in die des anderen und das historische und tatsächliche Werden verwandelt sich als reines Werden ohne Vergangenheit und Zukunft in eine metaphysische Kategorie und das macht seine Methode rigide [vgl. Merlio 2009, 56]. Er sieht nicht mehr die Wandlungen, sondern nur noch das Identische in jeder neuen Erscheinung, jede Bewegung wird zu «ewige[r] Ruh in Gott dem Herrn», wie im wiederum Goetheschen Incipit zum *Untergang des Abendlandes* geschrieben steht. In seinen über tausend Seiten unterbricht die Kategorie des Werdens ihre eigene Bewegung und kristallisiert sich zu einem großartigen Bild heraus, welches dem ähnelt, was Hegel als Erscheinung definiert: «das Entstehen und Vergehen, das selbst nicht entsteht und vergeht, sondern an sich ist» [Hegel 1999, Bd. 2: *Phänomenologie des Geistes*, 35]. Der Mangel an Vermittlung – Hegels Begriff für Übersetzung, Verwandlung, Veränderung und Metamorphose – in Spenglers Operation führt dazu, dass sein Bild der Weltgeschichte seine ästhetisch-scheinhaften und meta-

physischen Merkmale annimmt, wobei die Merkmale der Methode, wie Wittgenstein behauptet, charakteristisch werden für das Objekt und das bedeutet: für die Geschichte, welche eben hierdurch wieder in Naturhaftes zurückfällt.

Auch Walter Benjamin übersetzt die Goethesche Morphologie vom Natürlichen ins Historische und begründet so seinen Begriff von Geschichte, welche durch ihre Tatsachen hindurch auf empirische Weise etwas Ideales verwirklicht. In diesem Sinne versteht Benjamin das Ideal bzw. die Ideen als faustische Mütter. In seiner Übersetzung berücksichtigt er die Vielfalt der Ideen und den einzigartigen, monadologischen Charakter jedes einzelnen Phänomens gegenüber dem totalisierenden Gestus, der in allem, was wird, nichts anderes sieht als die ewige Wiederkehr des Gleichen. Die Ideen sind also mehrere, wenn auch nur von begrenzter Anzahl, und durch ihre übersetzerische, metamorphische Wechselwirkung mit den historischen Materialien erzeugen sie empirische Konstellationen, durch die sie sukzessiv ihre einzelnen Teile bis zu einer möglichst vollständigen Verwirklichung realisieren. Diese Konstellation wird von Benjamin auch als «Ursprung» oder «dialektisches Bild» definiert, d.h. als Begriffe, welche eben gerade das Urphänomen aus der natürlichen in die geschichtliche Sphäre übersetzen [vgl. Benjamin 1980, Bd. V.1: *Das Passagen-Werk*, 592]. In diesem Prozess ist es wichtig zu unterstreichen, dass die empirische Konstellation sich nicht nur als Analogie einer früheren Konstellation verwirklicht, welche ihr im Spengerschen Sinne «gleichzeitig» wäre, sondern auch auf dialektische Weise. Die beiden Konstellationen sind sich ähnlich, sie sind jedoch nicht identisch, da sie kontinuierlichen Umgestaltungen unterliegen.

In der Tat ist für Benjamin die Erfahrung mit Geschichte niemals nur analog, noch läuft sie auf die bloße Rationalisierung der Vergangenheit hinaus, um die Gegenwart zu rechtfertigen, wie es an bestimmten Stellen Hegel tut. Benjamin weiß, dass Geschichte im Ausgang von der Gegenwart geschrieben wird und dass das entstehende Bild nicht nur eine Wiedererkennung in einem vergangenen Zeitalter darstellt, sondern auch eine Operation der Dialektik im Stillstand: Auf der einen Seite wird das Bild des geschichtlichen Augenblicks festgehalten und der Prozess momentan unterbrochen, auf der anderen ist dieses Bild jedoch voller dialektischer

Energie, welche die Stasis erneut in Bewegung bringt.

Der Ursprung steht im Fluß des Werdens als Strudel und reißt in seine Rhythmik das Entstehungsmaterial hinein. Im nackten offenkundigen Bestand des Faktischen gibt das Ursprüngliche sich niemals zu erkennen, und einzig einer Doppeleinsicht steht seine Rhythmik offen. Sie will als Restauration, als Wiederherstellung einerseits, als eben darin Unvollendetes, Unabgeschlossenes andererseits erkannt sein [Benjamin 1980, Bd. I.1: *Ursprung des deutschen Trauerspiels*, 226].

Auf diese Weise entsteht eine Wechselwirkung zwischen Bewegung und Stasis, Dialektik und Analogie, Geschichte und Natur, Logik und Mythos, die in der Lage ist, eine ganze Epoche in einem Bild zusammenzufassen und gleichermaßen eine gesamte Epoche ausgehend von einem einzigen Bild zu entfalten, welches auf diese Weise einige der Eigenschaften des Urphänomens aufnimmt [Vgl. Benjamin 1980, Bd. I.2: *Über den Begriff der Geschichte*, 702-3]. Ebenfalls rezipiert Benjamin ein weiteres wichtiges Moment der Goetheschen Morphologie: die zarte Empirie, welche sich zutiefst dem eigenen Objekt anverwandelt und auf diese Weise im eigentlichen Sinne zur Theorie wird. Es handelt sich um eine Art Empathie, die im Einzelnen und Besonderen das Wesen des Ganzen zu erkennen in der Lage ist.

Erst der erlösten Menschheit, schreibt Benjamin in der dritten These zum Begriff der Geschichte, stünde die gesamte Geschichte wie in einem großen Fresko zur Verfügung [Vgl. Benjamin 1980, Bd. I.2: *Über den Begriff der Geschichte*, 694]. Spenglers Geschichtsphilosophie versucht, dieses Fresko zu malen, doch malt sie es nicht für eine erlöste Menschheit, sondern für eine zum Tode verurteilte Zivilisation. Aus diesem Grund kann sie einzig die Ruhe hinter jeder Bewegung sehen, anstatt gleicherweise die immense dialektische Energie in jedem Bild von Stasis, Ruhe und Tod zu erblicken und wäre es selbst das Bild Gottes, von dem wiederum Goethe nicht zögerte zu behaupten: *nemo contra deum nisi deus ipse*.

**Literaturverzeichnis**

Aristoteles, *Poetik*

Aristoteles, *Die Nikomachische Ethik*

Barbetta, M.C. [2000], J.W. Goethe filosofo della natura: cenni sull'interpretazione di Rudolf Steiner, in: *Verifiche* 19 (3-4), 277-315.

Benjamin, W. [1980], *Gesammelte Schriften*, hg. v. Rolf Tiedemann u. Hermann Schweppenhäuser unter Mitwirkung v. Theodor W. Adorno u. Gershom Scholem, Frankfurt a.M., Suhrkamp.

De Sanctis, F. [1996], *Storia della letteratura italiana*, Torino, Einaudi-Gallimard.

Goethe, J.W. [2000], *Werke. Hamburger Ausgabe in 14 Bänden*, hg. v. Erich Trunz, München, Deutscher Taschenbuch Verlag.

Goethe, J.W. [1987], *Goethes Werke Weimarer Ausgabe*, München, Deutscher Taschenbuch Verlag.

Hegel, G.W.F. [1999], *Hauptwerke in sechs Bänden*, Darmstadt, Wissenschaftliche Buchgesellschaft.

Hegel, G.W.F. [1985], *Ästhetik*, hg. v. Friedrich Bassenge, Berlin und Weimar, Aufbau-Verlag.

Hegel, G.W.F. [1955], *Vorlesungen zur Philosophie der Weltgeschichte*, hg. v. Johannes Hoffmeister, Hamburg, Meiner.

Jünger, E. [1980-1983], *Sämtliche Werke*, Stuttgart, Klett/Cotta.

Kant, I. [1998], *Werke in sechs Bänden*, hg. v. Wilhelm Weischedel, Darmstadt, Wissenschaftliche Buchgesellschaft.

Merlio, G. [2009], Die Herausforderung Spengler. Zu einigen jüngeren Spengler-Lektüren, in: *Spengler – Ein Denker der Zeitenwende*, hg. v. Manfred Gangl, Gilbert Merlio u. Markus Ophälders, Berlin/Bern/Brüssel/New York/Oxford/Wien, Peter Lang.

Ophälders, M. [2015], *Konstruktion von Erfahrung. Versuch über Walter Benjamin*, Nordhausen, Verlag Traugott Bautz.

Proust, M. [2002], *Auf der Suche nach der verlorenen Zeit*, Bd. 7: *Die wiedergefundene Zeit*, Frankfurt a.M., Suhrkamp.

Rykwert, J. [1976], *The Idea of a Town. Anthropology of Urban Form*

*in Rome, Italy and the Ancient World*, London, Faber and Faber.  
Spengler, O. [1983], *Der Untergang des Abendlandes*, München, Deutscher Taschenbuch Verlag.

### **Keywords**

Morphology; Metamorphosis; Dialectics; Genius; Translation; Philosophy of History; Aesthetics

### **Abstract**

Morphology and metamorphosis are analyzed as ways of genial translations. In the case of Goethe as a translation of natural rules into artistical rules (Faust), in that of Spengler and Benjamin as that of natural morphology into proceedings of philosophy of history. Metamorphosis and translation are ways of mediation between different fields of scientific and cultural activities. Moreover, they represent a mimetic and intuitive way of dealing with problems which does not transcend into mere logical thought. This part is treated also in reference to Aristotle and Hegel. At the end the approaches of Benjamin and Spengler are briefly criticized and compared in reference to their Goethean origin and to the difference between their outcome and solutions.

Markus Ophälders  
Università degli Studi di Verona  
E-mail: markus.ophalders@univr.it



## ROSA MARIA LUPO

BEYOND THE EIDETICS OF LIVING BEINGS:  
CONTINGENCY, PLASTICITY, INDIVIDUALITY

TABLE OF CONTENTS: 1. *The question of plastic form and its epistemological significance*; 2. *Metaphysics, phenomenology, biology in dialogue*; 3. *Life-world: Blumenberg's revisited phenomenology in dialogue with Goethe's morphology*.

1. *The question of plastic form and its epistemological significance*

**I**n *Knowledge of Life* George Canguilhem writes that «[i]t is quite difficult for the philosopher to try his hand at biological philosophy without running the risk of compromising the biologists he uses or cites» [Canguilhem 1952/2008, 59]. At the same time, as if he would like to respond to the objection that «[a] biology utilized by a philosopher» is «a philosophical biology, and therefore a fanciful one», he asks: «Yet would it nevertheless be possible, without rendering biology suspect, to ask of it an occasion, if not permission, to rethink or rectify fundamental philosophical concepts, such as that of life? Can one reproach the philosopher who has taken up the study of biology for choosing, among the teachings he has received, the one that has best enlarged and organized his thought?» [Canguilhem 1952/2008, 59]. It seems to be a rhetorical question which nevertheless exonerates the philosopher as innocent declaring the need of a kind of a *metabiological* approach in the biological problems which can be performed by the philosopher who assumes the task of the inquiry of living reality. In my opinion, such a kind of metabiological duty is achievable through a fruitful dialogue of metaphysics, phenomenology and morphology, inasmuch as each of these disciplines aims at the investigation of life. Establishing such a dialogue I will try here to give preferences to those positions which defend the role of contingency. Therefore, I will follow the principle that *saving (living) phenomena* means saving their contingency and, hence,

their plasticity and their individuality.<sup>1</sup> From this point of view my attempt will focus on two questions which are strictly connected.

The first one concerns the notion of form as plastic. The second one regards the epistemological significance of the question of plastic form.

As concerns the first question, I would like to analyse the question of the form as plastic from an ontological point of view using Franz Brentano's reading of the Aristotelian concept of *eidōs*. In his commentary of the Aristotelian ontology Brentano clearly points out that Aristotle's *eidōs* is never a rigid entity, but a "plastic receptor", bound to matter and distinguished – especially in living beings – by a metamorphic quality. It means that a living being is able to change, to develop – including the self-erasure processes –, if we would try to read the notion of *steresis* in the terms of dynamics of the so-called *idia*, defined by Brentano as *unknown individual differences*. It is the deep synergy between the notion of individual substance (*tode ti*) and that of form which allows Aristotle to elaborate a conception of living beings as absolutely moving, *in fieri*, according to his epigenetic ontogenesis emerging from his biological works. Such a doctrine receives still today the attention of authoritative biologists. For instance Ernst Mayr recognizes that «[a]fter all, Aristotle's *eidōs* had many of the properties we now ascribe to the genetic program» [Mayr 2004, 54],<sup>2</sup> where the central point is that the genetic program shows us how a teleonomic processuality characterizes living beings, inasmuch they are never given or entirely realized from their beginning as already fully accomplished entities.<sup>3</sup> In this sense, I would like to take into consideration the ontological question of plastic form referring to Edmund Husserl's phenomenology and Hans Blumenberg's critique of it, mostly as concerns the limits of Husserl's impressive research on the so called *eidetische Variation*. I will try to

---

<sup>1</sup> The concept of *sozein* should actually be discussed asking what *saving a phenomenon* means and what a phenomenon has to be kept in safe from.

<sup>2</sup> In this context Mayr also refers to Jacob's and Delbrück's works [cf. Jacob 1970; Delbrück 1971] according to which the Aristotelian notion of *eidōs* presents characters which are today recognized to be proper of the genetic program.

<sup>3</sup> The kind of metaphysics which I let interact with the ontology of living being as emerging from the biological inquiry is far from the paradigm of a rigid preformed identity, even if Aristotle's position is marked by a teleology that today's biology instead abandons.

understand the problem of eidetic variation looking at some theses of biology considered as morphology, namely as investigation of the *form of living forms*.

The second question, which is related to the first one, concerns the epistemological significance of the question of plastic form. Indeed, the assumption of a “mobile” ontological paradigm of the form implies the gnoseological question of the limits of an eidetic investigation, which are also the limits of the concept and of the representation as ways in which we try to grasp a form as a phenomenon that gives itself to us. The crucial gnoseological problem is transcendental since it is the question of the conditions of possibility of the intelligibility of the form. I would say that such a question is definable as a problem of critical epistemology – as Jacques Monod would suggest [cf. Monod 1970/1972, 37] – or as a real *obstacle épistémologique*, according to Gaston Bachelard’s view.<sup>4</sup> The question of the formal condition of intelligibility of the form as plastic is not so obvious for philosophy in times of new realism and actually it is already a fundamental question of the metaphysical tradition with its conception of form as the intelligible *par excellence*, as the ground founding the epistemic model of knowledge as *scire per causas*. For metaphysics this implies an ontological primacy of necessity over contingency, namely over that which has the nature of plasticity as concerns both the ontological level and the notional one. In short, if we would like to talk about living forms essentially subjected to a continuous morphogenesis never definitely accomplished, then the question – both for the philosopher and for the life scientist – is the following one: what are the conditions of possibility of the knowledge concerning life? We are always in front of the sceptical doubt which insists on the fact that our knowledge is doomed to failure since an a

---

<sup>4</sup> Bachelard’s epistemological obstacle does not mean the presence of «external obstacles, such as the complexity and transience of phenomena, or [...] the weakness of the senses or of the human mind» [Bachelard 1938/2002, 24]. It consists rather in «sluggishness and disturbances» which appear «at the very heart of the act of cognition, by some kind of functional necessity» [Bachelard 1938/2002, 24]. In my opinion they are depending on the way of speaking through absolute metaphors (in Blumenberg’s sense) which characterizes the scientific knowledge and those ontological operations which also life sciences perform.

priori knowledge, which is able to “anticipate” (through concepts, representations, deductions) that varied world of changing forms in which life consists, is impossible. Hence, the only heuristic possibilities are a posteriori descriptions which always remain limited and incomplete. In other words, our knowledge can only be a descriptive taxonomy which fails to account for the variation of the form according to the idea of knowledge as a kind of a valid knowing since it is able not only to declare that there are phenomena and how they are but especially why they are in that way.

The “why question” is still open in the field of biology since the most part of the genetic, phenotypic and epigenetic mutations have a casual character. It means that by their nature they escape the rational claim to identify a first principle or cause which explains why things are necessarily going or have gone in a certain way. The point is not that things do not necessarily go in a certain way in the sphere of living beings, but that it can simply happen that things have gone in a certain direction rather than in another one. In *The Epigenetics Revolution* Nessa Carey refers to Audrey Hepburn’s health influenced by the malnutrition which she suffered as a child during the Dutch famine. Carey explains that

[d]ifferentiated cells remember what cell types they are, even after the signal that told them to become kidney cells or skin cells has long since vanished. [...] Imprinted genes get switched off at certain stages in development, and stay off throughout the rest of life. Indeed, epigenetic modifications are the only known mechanism for maintaining cells in a particular state for exceptionally long periods of time [Carey 2012, 236].

Then, what is the epistemological problem? Accentuating the character of dependence between individuals (subsumed under the universal generalities of kinds and species to which they belong) and their specific classes of belonging – according to a model that life sciences import from the classical Aristotelian metaphysics – implies that the individual forms are “watered down”, even if we would like to look at the concrete reality which shows itself to our senses and gives itself to our heuristic reflection. The experience shows us that our knowledge of the individuals is not something wrong since it allows us to “get our hands”

(with all the problems that this obviously entails) on the world of the living, achieving the expected results. It is enough to consider the work regarding the genetic code which, properly deciphered, gives us back the confirmation of an invariability in the life-world, almost surprising in spite of the infinite individualities, each of them irreducible as concerns its own genetic makeup. The fact is that the effectiveness of our forecasts leads us to rely on our knowledge, but such a fact must be justified and understood as an epistemological question which implies an ontological question in itself. The epistemological question refers back to the ontological one, which I would formulate in these terms: if an intelligibility of form is possible for us, what space does contingency occupy in reality, what role does it play in determining the individual being of each living, what does it actually add in more, what does it entail? Is it truly conceivable as that which distinguishes itself from the essential core – and hence as something inessential in the determination of an individual – according to the Scholastic ontological distinction between *substantia* and *accidentia* by which the Aristotelian much more complex and problematic position is summarized? At this point, I would like to face the questions from the point of view that is most congenial to me, namely that of the metaphysical tradition with the help of Franz Brentano's ontological perspective.

## 2. *Metaphysics, phenomenology, biology in dialogue*

A good starting point may be a question that Brentano poses in his commentary on Aristotelian ontology, *Von der mannigfachen Bedeutung des Seienden nach Aristoteles*.

In the second chapter Brentano reads the question of the accidental being – one of the senses of being according to Aristotle [cf. *Metaph.*, E, 2, 1026a34] – and he wonders in what way the project of a general ontology as investigation of the being *qua* being is possible in front of the explicit Aristotelian indication that there is no science of the contingent since it is not possible to identify a necessary cause of it<sup>5</sup> – for Aris-

---

<sup>5</sup> The cause of the accidental is an accident itself [cf. *Metaph.*, E, 2, 1027a8] and hence a science of the accident is impossible [cf. *Metaph.*, E, 2, 1026b4 and 1027a19-

totle a condition that defines the knowledge specifically as *episteme*. Brentano treats the question sagaciously and his proposal essentially anticipates Husserl's phenomenological solution of the problem of the *eidetische Variation*. During his analysis of the matter Brentano writes:

But did we not just follow Aristotle in determining the peculiarities of the *on kata symbebekos*, and have we not thus subjected it to scientific scrutiny? True enough, but one must make careful distinctions. The concept of the *on kata symbebekos* is not *kata symbebekos* relative to that to which it is attributed, just as the concept of an individual is not itself an individual. Though it is not possible to have a science of individuals, yet the concept of the individual and its relation to species, etc., can be scientifically discussed. An individual in general can be divided into individual substance and individual accident. In the same way the impossibility of scientific scrutiny of *things* which are *kata symbebekos* does not vitiate the possibility of scrutinizing scientifically what *kata symbebekos einai* is [Brentano 1862/1975, 11-12].

We can find a confirmation for the fact that for Brentano it is possible to bypass the ban imposed by Aristotle, as we read in the just mentioned passage, in a very perspicuous notation where Brentano affirms that the ontological relationship – the «close affinity» [Brentano 1862/1975, 7] – between independent being and accidental being follows the same close relationship between kind and difference in the definition, even if accidental being does not constitute the specific difference that is anyway a determination inscribed in «the essence of the other [*scil.* of the kind]» [Brentano 1862/1975, 7]. And about accidental being he adds: «But cases where it serves in a definition in the place of the unknown difference are not particularly rare, and it is often of service when we try to find the latter. The *proprium* (*idion*) of the *Topics* is in this way united with a being [*Wesen*]» [Brentano 1862/1975, 7-8]. In other words, the individu-

---

26] since the object of a science is a necessary reality, a reality which is always or for the most part, while the accident is never that. This epistemological criterion implies that we can have an empirical experience of the accident but not an epistemic knowledge.

ality of each individual person worsens, compacts, thickens in the proper features or ontological traits that are often completely accidental, in the sense that they do not change the intimate nature (essence, *Wesen*) of the individual if they change and nevertheless they show the difference – which Brentano defines as *unknown* – existing between individuals belonging to the same kind and the same species. This classic position of traditional ontology actually seems to be aware of the ontological force of accident despite the *chablon* according to which metaphysics would be essentialist at the expense of the contingent nature of reality. With the appropriate differences such a position can also be considered a good philosophical transcription of what biology teach us about the evolutionary processes that lead to final results arising from «an interaction of numerous incidental factors» [Mayr 2004, 33]. In this way, Mayr clearly affirms that «[c]hance with respect to functional and adaptive outcome is rampant in the production of variation» [Mayr 2004, 33]. Perhaps it is not so interesting, given that we consider evolution on a population and non-individual level. But on an individual level the things are not very different since «[d]uring meiosis, in the reduction division it [*scil.* chance] governs both crossing-over and the movement of chromosomes» [Mayr 2004, 33], namely those processes which in the sexual reproduction of the living preside over the emerging of different individuals of the same species, different from their parents and different from each other, even if they are born of the same parents.

Returning to Brentano's analysis, he specifies that in order to understand how things concerning an individual substance are we need the specific difference – namely the species that articulates the belonging of that individual substance to a kind – as well as an even more precise degree of distinction, although changeable, plastic, iridescent, depending on the givenness of unnecessary conditions of being, as concerns the individuation of the traits of the species, but unique and individually embodied so that each individual is distinguished from others of the same species. These traits are not the result of a need that presides over the ontogenesis of the individual, even if they are undoubtedly bound to the genetic belonging of a specimen to one species and not to another.

We can describe this fact ontologically in the following way: being a philosopher does not belong to the *eidos* of Socrates as a human



being, but being a philosopher is a trait in Socrates that however distinguishes him *essentially*. To anyone who asked what “Socrates” is, without knowing that Socrates is the proper name of a human being, we could legitimately respond: “Socrates is a philosopher!”, bypassing the need to specify that Socrates is a human being. This is because the determination of being a philosopher is inscribed as an ontological possibility in the human being Socrates and Socrates is just a human being and not a horse, who does not have the faculty of philosophizing by nature. Such an example gives a vivid image of what for its part the morphology of the living beings shows us. As a matter of fact, we here move in the sphere of phenotypic plasticity. In their essay *Phenotypic plasticity in development and evolution: facts and concepts* [2010] Fusco and Minelli present the state of affairs to us. The idea of a completely passive condition of living forms as exposed to evolutionary forces must be balanced not only with the self-organizing ability of the living being, but also with its disposition as a system able to self-regulate and to keep homeostasis unchanged as well as with its ability to heal alterations (e.g., epigenetics) which it may encounter in relation to a certain environmental relationship. Such an activity of the living being occurs also at a phenotypic level: the phenotypic evolution depends on the phenotypic variation and in multicellular organisms the phenotypic variation is to be read as «variation in developmental trajectories throughout the ontogeny» [Fusco & Minelli 2010, 547]. Hence, «[a]n individual organism’s trajectory is the result of a unique interaction between its genome(s), the temporal sequence of external environments to which it is exposed during its life and random events at the level of molecular interactions in its tissues» [Fusco & Minelli 2010, 547]. It means: randomness does not play a merely accessory role in the determination of the living being. On the contrary, it is an essential component of the constitution of the living being according to its plastic development. This thesis of the biological inquiry concerning the morphological, physiological and behavioural plasticity of living being does not clash against the ontology of the singular identity pursued by philosophy with its tools.

The ontological perspective emerging from Brentano’s position allows us to underline the sense of a *modus essendi* of the living be-



ing, namely its irreducible plasticity lying at the core of its essence. Its plasticity constitutes the irrepressible element of determination, whose loss would imply the loss of the individual as determined singularity. Nevertheless, such a plasticity does not throw away the aspect of invariance in variation and of unity in the diversity. Such an aspect opens to the epistemological possibility of an intelligibility of form as plastic. On the one hand, a putting in brackets of the contingent is problematic since the contingent binds the form of being of the living form. On the other hand, the presence of the contingency as a reason that supports the plasticity of the living does not however prevent us from observing the form of the living being as the ability to be “stable” and “mobile” at the same time. At this point we are entangled in Brentano’s epistemological question which he resolves by following that path which also Husserl will follow in dealing with the question of eidetic variation.

According to Brentano we could never have an *episteme* in the manner of a science that articulates its content in an aprioristic theory, namely before any empirical experience of the individual contingent, if it is of the individual contingent that we would like to have a science. Thus, Brentano respects Aristotle’s dictate. However, this limitation binding us to the contingent experience *hic et nunc* does not prevent us from knowing *formaliter* what the contingent is and, hence, from recognizing that we are in the presence of a particular case of contingency when we are faced with single cases of it. The identification of the formal determinations or reasons of what the contingent is does not represent an operation in our knowledge that violates the Aristotelian principle of the impossibility of a science of the accidental since we will only describe the characteristics which formally, namely in a pure way and a priori, contingency has and which distinguish it from the necessary. It does not mean determining a first cause, because such an act of knowledge requires that we look each time at the concrete existence of the contingent *hic et nunc*. In other words: this way of proceeding means the possibility of an eidetics of the contingent as such and not a specific doctrine of the accidentals as they give themselves in the world. Brentano seems to be satisfied with this solution which after all follows the canon of the traditional *metaphysica generalis* that is a general, formal ontology. If it is possible to identify the defining characteristics of

the ontological modus of the accidental, this latter can be regarded as the object of an epistemic knowledge in the same way as the substance itself or its principles (*archai*) and elements (*stoicheia*), identified by Aristotle in matter, form and privation as regards the kind of the sensitive substances (*aisthetai ousiai*) [cf. *Metaph.*, Λ, chapters 2-4].<sup>6</sup>

In front of the same question that in phenomenology is known as the problem of the eidetic variation Husserl's position is even more radical, as we can see in one of the most complex volumes of *Husserliana*, namely *Zur Lehre vom Wesen und zur Methode der eidetischen Variation* [cf. Husserl 2012]. As the title of the volume suggests, for Husserl the eidetic variation is not to be understood as an ontological fact, but for phenomenology it is rather a method of knowledge of the phenomena in the sense that the phenomenologist recognizes that each type (*Typus*) is a variation of an *eidōs*, but at the same time it is the individual concretion of the pure *eidōs* which notoriously is an *unreal* and *ideal* (given) phenomenon for Husserl who therefore defines himself as a Platonist.<sup>7</sup> The articulation of the *eidōs* in *types* has to do with the fact that each *eidōs* manifests itself in the mundane sphere through adumbrations. The *Abschattungen* – that we can also think of as the phenotype of the phenomenon (*eidōs*) as given in flesh and blood – make the ideal purity of the *eidōs* “dirty”. They do not pertain to the regime of the necessity of the *eidōs*. On the contrary, they are given possibly only thanks to the relevance of each of them to the categorical level through which each type is articulated. For instance, the fact that a table has spatial dimensions has to do with the fact that the category of spatiality

---

<sup>6</sup> It is interesting that the criterion of variation in a permanent identity is present also in Aristotle as concerns the question of the principles of the individual substances. Indeed, he recognizes that on the one hand the principles are different for the different substances, but on the other hand they are universal and identical for all substances in an analogical way (*kat'analoghian*) [cf. *Metaph.*, Λ, 4, 1070a31-33].

<sup>7</sup> Cf. Husserl 1913/1983, 40-42. According to the distinction between «object» and «something real», an *eidōs* (or *idea*) can be defined as an (ideal and hence unreal) object and it is «an atemporal being». Such a distinction implies for Husserl an «abyss» between consciousness, and therefore, its eidetic object and reality: «Here, an adumbrated being, not capable of ever becoming given absolutely, merely accidental and relative; there, a necessary and absolute being, essentially incapable of becoming given by virtue of adumbration and appearance» [Husserl 1913/1983, 111].

concerns the material existence of the table, but not its existence *idealiter* as an essence that inhabits a material. In a sense, the adumbrations are determinations which do not articulate the eidetic categories. They are only typological determinations, and for this reason they can, according to Husserl, easily be left out and put out through the *epochè* so that each type can be reduced to the *eidōs* under which it is to subsume. Then, the effective reality does not seem to have any real power of determination of the content of the *eidōs*, whose formal determination derives from the work of the transcendental eidetic reduction through which it becomes an immanent object of a consciousness as given to consciousness. Indeed, *eidōs* in Husserl's phenomenology represents an absolute purification from the contingency depending very closely on the way in which the transcendental reduction constitutes every given phenomenon as intentioned by a conscience. The *eidōs* appears and has a phenomenal status only if it enters the sphere of a consciousness. The entire ontology which Husserl builds in the first book of *Ideas* and which he presents as the general ontology at the base of the different regional eidetics grounding the various corresponding empirical sciences [cf. Husserl 1913/1983] makes sense only if the *eidōs* is grasped by the subject's gaze.<sup>8</sup>

Certainly, Husserl is convinced that what is identical (the *eidōs*) in different types is a universal which is responsible for the principle of unity of all single phenomena that otherwise would only be scattered among their shadows. The types, according to a Hegelian terminology that Husserl uses, are "moments" of the eidetic general being in the sense of an identity that is shared between the various single concrete moments [cf. Husserl 2012, 14], defined by Husserl as *die strenge Identität des Allgemeinen*. The fact that the *eidōs* is a correlate given of consciousness does

---

<sup>8</sup> I have not here the possibility to discuss whether the position which poses the ego as condition of possibility of the phenomenality of phenomena and therefore of the *eidōs* should be defended or not according to the counter-positions that seek to free the phenomena from the transcendental subjectivity, as for instance Jean-Luc Marion's phenomenology of donation proposes [cf. Marion 1989; 1997; 2001; 2005]. However, there is no doubt that the question of the ontogenesis of a phenomenon seems to concern exclusively its relationship with an intentional subject and not the problem of its own constitution by itself.

not mean that it has not an ontological consistency, even if it is an incorporeal object. It is a given that fills the eidetic intuition or that which Husserl also calls the “ideation as act of grasping the essence” (*«Ideation als Wesen erfassender Akt»*) [cf. Husserl 2012, 29]. The givenness of the essence is attested through or in the specific act of the ideation, but for Husserl there are various degrees of evidence. The apodictic evidence, in which an essence is fully manifest in its indubitable truth, is almost a sort of borderline case. However, the *eidōs* is always that to which the types refer in approximation. Husserl calls this approximation *variation*: *«In der Variation habe ich Selbiges, das seine wechselnden Varianten hat. [...] In der Veränderung habe ich ein Individuelles, das durch eine Zeitdauer hindurch fort dauert und in verschiedenen Phasen dieser Dauer wechselnde Zustände hat, es ist in jedem Moment dasselbe, aber in jedem Moment anders»* [Husserl 2012, 219].

What is unsatisfactory in such a dialectic of sameness and change? The problem is not that it seems to violate the principle of non-contradiction, but that it assumes two ontological levels: one is that of an invariance and the other is that of a changeability of traits that have then necessarily to be assumed as unstable and transient traits and therefore as discardable in the act of ideation. This is precisely the result of a method by which reality is read and interpreted. On the one hand, Husserl’s phenomenology recognizes the importance of an effective reality, namely the contingency determining the variations. On the other hand, this variation is irrelevant for the purpose of grasping the essence, the *eidōs* as the invariable in the variation. In this sense, such a phenomenological position can be considered as essentialist and every kind of essentialism is notoriously viewed with very little sympathy. Nevertheless, not every phenomenologist is an essentialist, which can be exemplified with Hans Blumenberg who outspokenly criticizes Husserl’s position.

### *3. Life-world: Blumenberg’s revisited phenomenology in dialogue with Goethe’s morphology*

In the essay *Lebenswelt und Technisierung unter Aspekten der Phänomenologie in Wirklichkeiten in denen wir leben* Blumenberg gives us an extraordinarily lucid analysis concerning life-world. His departing point is

the following fact: «*Alles, was in der Lebenswelt wirklich ist, spielt in das Leben hinein, wird genutzt und verbraucht, gesucht und geflohen, aber es bleibt in seiner Kontingenz verdeckt, d.h. nicht als auch-anders-sein-könnend empfunden*» [Blumenberg 1981/2012, 23]. Hence, a philosophy that wants to be faithful to life-world needs to open up the accidental element characterizing life. Blumenberg's critique of Husserl's *Wesenslehre* concerns quite evidently its reduction of the *Lebenswelt* in its "potentiality to be something other" to an "object distinguished through ideality" («*durch Idealität ausgezeichneten Gegenstand*») [Blumenberg 1981/2012, 25]. Indeed, in this way Husserl proposes a limit-concept of life-world (*Grenzbegriff der Lebenswelt*) which is themed as a well determined invariable object inasmuch as it is regarded by the "phenomenological eye" only as an *eidos* at the expense of its ontological wealth, which is instead contingent and multiform. Hence, Blumenberg is very explicit in declaring the loss in the *Wesenslehre* and in the method of the eidetic reduction which "gains" a limit-representation (*Grenzvorstellung*) of life-world as an ahistorical (*geschichtslos*) reality: «*[D]ie Ungebundenheit der eidetischen Variation [wird] zurückgeführt auf die Methodik der Beschreibung*» [Blumenberg 1981/2012, 25]. In other words: the various and unpredictable content of life-world is assumed as a noetic object of possible *cogitationes* described purely and a priori according to the method of the eidetic description. The consequence is then the loss of the concrete human being (*der konkrete Mensch*) in its infinite and open morphogenesis of its Self, always susceptible to metamorphosis, since such an eidetic doctrine chains the human being to a static and rigid figure, namely to an invariable eidetic representation.<sup>9</sup>

---

<sup>9</sup> Cusinato highlights the problematic nature of an eidetics of the living being, whose «identity cannot be thought as substance which remains always the same» [Cusinato 2018, 33; all the quotations from this work are my own translation]. The science, which has an eidetic constitution as epistemic knowledge, has the limit of «focusing attention on the general, the repeatable, the reversible, excluding the singular, the unpredictable, the irreversible» [Cusinato 2018, 33]. On the one hand, Cusinato shows the "positivity" of Husserl's eidetic variation since it is a restriction for the variation which is not posed by the subject, but which is «given objectively by the phenomenon itself» [Cusinato 2018, 122]. In that sense, such a constraint constitutes the essence of the real, concrete phenomenon. On the other hand, Cusinato points out that the living being, and specially the person, is the transgression of the variation since it is an «open *destination* [...]

The most relevant problem, however, is that Husserl's eidetic variation considers contingency only in relation to the need for the position of a given *eidōs*. In this way contingency does not count as an ontological manner of phenomena free from any eidetic determining pre-giveness (*Vorgegebenheit*). Despite the aim of revealing life-world in its irreducibility to the order of the necessary, Husserl presents the *Lebenswelt* as the object of a theoretical description which implies the *epochè* of contingency that is precisely the trait of the unpredictable variability in life-world impossible to be deleted according to Blumenberg. Since for him a radical phenomenology should lead to a *Forcierung der Kontingenzenz* [cf. Blumenberg 1981/2012, 48] he promotes a revision of the Husserlian concept of life-world which would be a betrayal of the spirit of phenomenology as openness to the phenomena as such inasmuch as Husserl's concept of life-world is the result of the methodical instrument of reduction which seeks the "unbreakable sameness in the otherness" of the general essence,<sup>10</sup> namely the invariable form of each phenomenon (including world and life) purified from any accidental character.

Blumenberg's revision seems to be much more generous to the concrete, effective life-world than Husserl's methodological path, but it poses us again in front of the question of the conditions of possibility of a knowledge of life that could be able in some way to mend the tear with the reality that the essential eidetic nature of the scientific model of knowledge produces. In a sense, the epistemic knowledge of life cannot renounce its eidetic structure since that element of invariance, of stability, is proper of reality that is not limited to being a confused self-con-

---

non-deductible from an already accomplished *eidōs*» [Cusinato 2018, 124]: «It is possible to develop the concept of identity by resorting to Husserl's eidetic variation. In this case, identity becomes a material constraint for the possibilities of variation of the Self. Nevertheless, a personal singularity is just that which can overcome such constraints by a self-transcending. In this way it can express its own physiognomy» [Cusinato 2018, 12]. From an epistemological point of view such an ontological condition means that our knowledge of life has to consider the variation as free from ontological, strictly determined rules. In his critique of a pure eidetics of life Blumenberg underlines the impossibility of previsions concerning the variation because of the contingent character of the variation itself and the role of the chance in it.

<sup>10</sup> Blumenberg's interpretation of Husserl's phenomenology outlines Husserl as an essentialist thinker.

tradictory chaos. Every phenomenon shows itself in its essence. This main thesis in phenomenology determines its eidetic approach to the phenomenal world. Nevertheless, at the same time, in order to be on the side of life-world, our knowledge must take into account that variable rhythm which is proper to the life and which emerges from the nature of living beings, as Blumenberg points out. We can for instance refer to those processes of speciation which represent an ontological dynamic of development in the life-world between permanence and uniqueness. Such processes give us a vital and moving image of living reality which structurally is always open to a constant novelty as well discussed by Sean B. Carroll, who summarizes such a matter of fact with the following motto: «Existing genes and structures provide the means for innovation» [Carroll 2005, 288]. In other words: in force of their nature – which is the element of invariance – living beings are structurally forms of givenness ontologically new, unexpected and unpredictable.

What we are facing here is a delicate balance analysed by Monod in his famous book *Chance and Necessity* – a work which is today outdated as regards some assertions, but not as regards the ontological paradigm proposed by him. According to it living reality gives itself between the existence of structures endowed with the “property of invariance” and the “occurrence of perturbations” in these structures [cf. Monod 1970/1972, 29]. Certainly, our point of view about life and living beings is today quite different from the claim underlined by Monod in the seventies: «We would like to think ourselves necessary, inevitable, ordained from all eternity. All religions, nearly all philosophies, and even a part of science testify to the unwearying, heroic effort of mankind desperately denying its own contingency» [Monod 1970/1972, 44]. Instead, today the prevalent perspective is opposite, if we consider the “principle of weakness” lying at the base of the different disciplines. For instance, theology has become weak in order to save human contingency and finiteness; philosophy centralizes the role of contingency and otherness as well as the plastic nature of life;<sup>11</sup> the life sciences have

---

<sup>11</sup> The notion of plasticity plays a fundamental role in the book by Catherine Malabou with the paradigmatic title *Ontologie de l'accident. Essai sur la plasticité destructrice*, where reality is seen in its constitutive contingent plastic nature [cf. Malabou 2009].



since long abandoned “orthogenetic” visions and liberated the evolutionary processes from the teleologic criterion by pointing out the presence of an irregular zig-zag movement in living beings. Manfred Eigen and Ruthild Winkler highlight this in a volume with an emblematic title: *Das Spiel*. They warn us that the game is a «*Naturphänomen, das in seiner Dichotomie von Zufall und Notwendigkeit allem Geschehen zugrunde liegt*» [Eigen & Winkler 1975, 11]. There is a clear Goethean morphologic perspective that lies at the core of this ontological vision of natural life between necessity and contingency. As is well known, Goethe considers metamorphosis as a “venerable” but at the same time “dangerous gift” («*höchst ehrwürdige, aber zugleich höchst gefährliche Gabe*» [Goethe 2000, 35])<sup>12</sup> since it is tension, “game” between two forces, namely the *vis centrifuga* and the *vis centripeta*, the “subversive” one which destroys the form (and hence the knowledge) and the “conservative” one which is like a tenacious resistance that on the contrary preserves the form. Such an image of metamorphosis as a dialectic between the tension towards destruction and dispersion and the tendency to persistence can be described referring to Eigen’s and Winkler’s analysis of the form of living beings:

Das Erscheinungsbild der Wirklichkeit ist stark strukturiert. Konservative Kraftwirkungen frieren den Zufall ein und schaffen beständige Formen und Muster. Dynamische Ordnungszustände entstehen aus der zeitlichen Synchronisation physikalischer und chemischer Prozesse unter ständiger Dissipation von Energie. Die Ordnung des Lebens baut auf dem „konservativen“ wie auch auf dem „dissipativen“ Prinzip auf. Die Gestalt der Lebewesen, die Gestalthaftigkeit der Ideen, sie beide haben ihren Ursprung im Wechselspiel von Zufall und Gesetz [Eigen & Winkler 1975, 87].

---

<sup>12</sup> Cf. Goethe 1988, 43: «The idea of metamorphosis deserves great reverence, but it is also a most dangerous gift from above. It leads to formlessness; it destroys knowledge, dissolves it. It is like the *vis centrifuga*, and would be lost in the infinite if it had no counterweight; here I mean the drive for specific character, the stubborn persistence of things which have finally attained reality. This is a *vis centripeta* which remains basically untouched by any external factor».



At this point, how can we read life-world in front of the aporia of the intelligibility of an order which escapes an aprioristic eidetics since it is essentially determined in a part by chance, but which cannot be reduced only at the level of an empirical variable because of the presence of a certain permanent necessity? The question of the legibility of the world is expressly posed by Blumenberg who asks whether «phenomena can “be read”, reality can be spelled as if it were exposed in an open book, whose characters await only to be deciphered» [Bodei 1984, ix].<sup>13</sup>

We could proceed in this way, if living reality were marked only by the order of necessary rules and by the trait of generality. But we are discussing on forms of life that are structurally marked by their own accidental singularity. Blumenberg offers us a *Theorie der Unbegrifflichkeit* which has its strong point in a “weak” idea of concept. Exactly this is the fertile and epistemologically fruitful aspect of his thought which allows a use of metaphors in front of a reality which eludes every rigid conceptual determination. Blumenberg explains that a concept must be undetermined enough to grasp the concrete with its novelty in comparison to that which is already met and experienced.<sup>14</sup>

It is a significant change in the idea that concepts are able to catch reality according to a vision which believes that concepts are ways to fix things against their dispersion and their escaping from our gaze. Blumenberg, however, is aware that the concept is the result of an *actio per distans*, inasmuch as it is operative in the distance from its object as a kind of its replacement. By its nature as a substitute – which reminds of Heidegger’s meaning of phenomenon as *Erscheinung* in the sense of *das Meldende* [cf. Heidegger 1927/1993, 29-30]<sup>15</sup> – a concept is as an im-

---

<sup>13</sup> All the quotations from Bodei’s essay are my own translation.

<sup>14</sup> Cf. Blumenberg 2007, 11-12: «*Der Begriff muß genügend Unbestimmtheit besitzen, um solche herankommenden Erfahrungen noch so erfassen zu können, daß entsprechend zweckmäßige Einstellungen auf sie auch dann bezogen werden können, wenn im Detail in der vollen Konkretion Abweichungen von vergangenen Erfahrungen bestehen*».

<sup>15</sup> According to Heidegger, phenomenon as *Erscheinung* means that the thing (the proper phenomenon in strict, “original” meaning) never shows itself by itself, but through something other which makes it known («The expression “appearance” itself in turn can have a double meaning. First, *appearing* in the sense of making itself known as something that does not show itself and, second, in the sense of what does

age or a representation, actually «*das Instrument [...] der entspannten Vergegenwärtigung des Nicht-Anwesenden*» [Blumenberg 2007, 27]. In this way, as a substitute open to the novelty of reality the concept is above all «*das Instrument einer Anwartschaft auf neue Gegenwärtigkeit, neue Anschauung*» [Blumenberg 2007, 27]. In short: without concepts we cannot observe anything, neither in the first nor in the second moment (namely in the time of the experience and in that of reflection) since the concept performs the same phenomenological function that Heidegger attributes to the *logos* as *deloun*.<sup>16</sup> The concept is a kind of manifestation. But it is a manifestation of manifestation, given the phenomonic character of reality. It means that the possibility for a concept to reveal reality lies in a prior availability of the latter to be a phenomenon, to give itself to us in a manifestation. Because of this primitive openness of reality to us the concept can be a sort of facilitation for the «*Verfügbarkeit des Gegenstandes [...] abrufbar zu machen*» [Blumenberg 2007, 28].

This phenomenological thesis corresponds to Goethe's trust underlying the morphological project and in a way still grounding life sciences today. It is a trust not in the cognitive human possibilities, but rather in the phenomonic ones of natural life. Blumenberg is careful to refer back to Goethe's words in the *Ergänzungen zur Farbenlehre* – (a phenomenon means: «*in seiner ganzen Einfalt erscheinen, seine Herkunft aussprechen und auf die Folgerung hindeuten*») which he comments in this way: «The Goethean pragmatics of knowledge is determined by the belief that man does not force his way into nature as an intruder but always already enjoys the richest communion with truth from the midst of nature and by virtue of its favor» [Blumenberg 1960/2010, 29].

---

the making itself known – what in its self-showing indicates something that does not show itself» [Heidegger 1927/1996, 26]). In this way the concept *Erscheinung* marks the presence of an absence and the necessity of a substitute for the phenomenality. In a way, Blumenberg's metaphorology depends on a similar dialectic of presence and absence in phenomenality, as I will try to show.

<sup>16</sup> Cf. Heidegger 1927/1996, 28: «Rather, *logos* as speech really means *déloun*, to make manifest “what is being talked about” in speech. Aristotle explicates this function of speech more precisely as *apophainesthai*. *Logos* lets something be seen (*phainesthai*), namely what is being talked about, and indeed for the speaker (who serves as the medium) or for those who speak with each other. Speech “lets us see,” from itself, *apo...*, what is being talked about».

Hence, the notion of concept as *deloun* gives us a fertile heuristic possibility, inasmuch as we recognize that concepts “constitute objects”<sup>17</sup> and are “representation of representation” («*Vorstellung der Vorstellung*»),<sup>18</sup> i.e., reduplications that reveal a transcendental opening of subjectivity to reality – of course, with all the problems that the openness of the knowing subject to the world as its object of knowledge implies. However, the thesis relevant for us is the fact that the presence of concepts – as Blumenberg suggests us – marks the absence of phenomena<sup>19</sup> and this is a stalemate for us since it is the fundamental question on the validity of our knowledge. Such a question is typical of each theory that comes after the mere empirical experience of phenomena. In order to get around it Blumenberg offers us an epistemologically important use of metaphor. Since the metaphor «*nutzt [...] eine Stelle schwacher Determination aus*» [Blumenberg 2007, 61], it dribbles the restrictions of too strong determinations such as the concept of an essence as a marker of a closed and immobile identity.<sup>20</sup>

Indeed, Blumenberg is convinced that the metaphorical way can be helpful for establishing «a more friendly and trusting relationship» with nature [Bodei 1984, xix]. In this manner it would be possible for us to «discover a hidden and forgotten wealth of meanings» and create «a new way of relating to the world» [Bodei 1984, xix]. From this point of view, then, our language as well as our concepts, our images and our representations are not merely a means between us and the phenomena. They have rather a heuristic function in continuity with the human,

---

<sup>17</sup> Cf. Blumenberg 2007, 40: «*Begriffe beruhen nicht nur auf Gegenständen, sondern Begriffe konstituieren auch Gegenstände*».

<sup>18</sup> Cf. Blumenberg 2007, 40. If a phenomenon shows itself through a representation, then a concept is a representation of a representation according to the logic that a concept is itself an object of representation.

<sup>19</sup> Actually, it is so also for Husserl, who considers that the object in the eidetic intuition is given as if it would be present in flesh and blood, even if it is not materially in this way. That is not only since it is impossible for a material phenomenon to be literally contained by the “space” of the consciousness in its extension, but rather since the power of the concept is to “recall in presence” a phenomenon which is not *hic et nunc* in front of us.

<sup>20</sup> I do not completely agree with Blumenberg on this aspect since in my opinion a lot depends on the content that the concept brings in itself.

albeit in a sense impossible, desire that the world can reveal itself in the exact predictability of its phenomena, giving itself generously and gratuitously in the complex of its meaning as «a totality of nature, life and history»:

Der Wunsch, die Welt möge sich in der anderen Weise als der der bloßen Wahrnehmung und sogar der exakten Vorhersagbarkeit ihrer Erscheinungen zugänglich erweisen: im Aggregatzustand der ‚Lesbarkeit‘ als ein Ganzes von Natur, Leben und Geschichte sinnspendend sich erschließen, ist gewiß kein naturwüchsiges Bedürfnis, wie es das der Magie ist, über unbeherrschte Gewalten Macht zu gewinnen. Dennoch gehört dieser Wunsch zum Inbegriff des Sinnverlangens an die Realität, gerichtet auf ihre vollkommenste und nicht mehr gewaltsame Verfügbarkeit [Blumenberg 1983, 10].

Our desire is nothing more than our request to reality to which we ask not only to become visible to us, but to give us its sense according to that kind of principle which Erich Rothacker defined as *Satz der Bedeutsamkeit* and which Blumenberg takes up as the matrix of our desire through which we establish our relationship with phenomena. There is again something of Goethe’s logic in this hermeneutic phenomenology: nature, defined by Goethe as a *lebendiges Buch*, may still not be understood (*unverstanden*), but it is not incomprehensible (*unverständlich*).<sup>21</sup> It means that the order of significance is not merely phenomenal in the sense of a relationship of a simple mirroring of the phenomena in our theories. Rather it is a much more problematic relationship. The problem is not that things do not manifest themselves, or that they do it only partially. For Goethe, who often seems to be a hard, more Husserlian phenomenologist than Husserl himself, saying that a thing does not indicate what it is, is affirming that it is not what it is.<sup>22</sup> Nevertheless, is the opposite possible?

<sup>21</sup> Cf. Goethe’s verses in the poetic letter *Mein altes Evangelium* to Johann Heinrich Merck, later published with the title *Sendschrieben*: «Sieh / so ist die Nature in Buch lebendig, / Unverstanden doch nicht unverständlich» [Goethe 1950, 393].

<sup>22</sup> Cf. Goethe 1952, 629: «[E]ine Sache zeige nicht an, was sie sei, heißt ebensoviel als sagen, sie sei nicht, was sie sei».

Actually, phenomenology teaches us that *der Schein* is also a case of phenomenality, but the transit from the being (essence) of the phenomenon to its appearing is interrupted by a sort of manifestation that turns our gaze away from the truth of the phenomenon. However, without opening these specifically phenomenological questions, it is important to underline that according to Blumenberg the metaphor is not a dissolution of the limits of our sensible and empirical perception of the givenness of natural phenomena, but rather it is the “device” for a kind of self-recovery for our language (and hence for our rational commitment) whose scarcity and weakness we do constantly experience. Overcoming the ancient, blind, epistemological trust in the «perfect congruence of logos and cosmos» [Blumenberg 1960/2010, 2] since «for antiquity, the logos was fundamentally adequate to the totality of what exists» [Blumenberg 1960/2010, 2], we discover indeed that the poverty in our relationship with the phenomena is the poverty of our language emerging from the way in which the language forms itself before a reality whose givenness is chaotic and irreducible to static models: «*Die Armut unseres Wirklichkeitsbezuges (inmitten des Reichtums unserer Möglichkeitsbeziehung) ist nicht erst eine Armut der Erkenntnis, der Wahrheit, der Theorie, sondern schon eine solche der Sprache, die sich innerhalb des lebensweltlichen Horizontes der nichtmodalisierten Gegebenheit ausbildet*» [Blumenberg 2007, 88]. Our use of metaphors is not a mere arbitrary game, but rather a kind of cure, a remedy that allows us to meet reality, also in its dispersion and its disappearance. In epistemological terms, the use of “metaphorical devices” is precious because of its power of safeguarding the contingency. In this sense, the metaphorical method seems to be an alternative to the eidetic one which purifies reality from its dirty matter through the transcendental reduction. The fact is that our scientific theories, hence also the biological ones, resort to the device of absolute metaphors, that is, of those metaphors that «prove resistant to terminological claims and cannot be dissolved into conceptuality» [Blumenberg 1960/2010, 5].<sup>23</sup> Obviously, metaphors neither express a complete, strict truth nor offer definitive answers, but they help us to inhabit the “texture” of reality as a totality

---

<sup>23</sup> Eigen’s and Winkler’s game as well as the idea of a cyphered reality or of a codex of life are examples of absolute metaphors.

which as such is never «nonexperienceable, nonapprehensible» [Blumenberg 1960/2010, 14].

It is evident that here we are in front of the bottleneck between the option for what Canguilhem defines «a crystalline (i.e., transparent and inert) intellectualism» [Canguilhem 1952/2008, xvii] – which is for instance the method of an unmitigated eidetics – and the abandonment to the blind mistrust that there is no constant in life-world since contingency is a strange, dark and inaccessible entity which guides life as it pleases. Nevertheless, when Canguilhem warns us that «[l]ife is formation of forms, knowledge is the analysis of in-formed matter» [Canguilhem 1952/2008, xix], he perhaps offers us the hope of reconciling the needs of a knowledge that feeds on the aprioristic claims of a transcendental perspective and those of all scholars who point out that without experience we have nowhere to go. *Knowledge as the analysis of in-formed matter* means that we must not dismember life-world in rigid conceptual forms. Rather, our duty is an inquiry able to look at living in-formed matters as «totalities whose sense resides in their tendency to realize themselves as such in the course of their confrontation with their milieu» [Canguilhem 1952/2008, xix]. According to this methodological principle Canguilhem can therefore affirm that living forms «can be grasped in a vision, never by a division» [Canguilhem 1952/2008, xix], namely not through a rigid determination of their definitory content, which does not consider all variability of their existence *hic et nunc* proper of each living form in its milieu, historicity, etc. In phenomenological terms, it means the necessity to face every singular living form in its individuality according to the different ways through which each form shows itself by itself in its being a form of counter-intentionality. All that implies consequently that the rational commitment in our knowledge of living reality has to respect life as an original phenomenon that as such always precedes the knowledge about it that we can elaborate. Recognizing the dependence of the living being on something other than its own essence (like contingency and variable alterity) is a decisive step in order to understand how living beings are a complex relational plot, which can be neither simply reduced to the model of a pure subjectivity nor hypostatized in the ontological one of an immobile substance whose components must be studied. In other words: each liv-

ing form cannot be described as the mere sum of its parts. In this sense, Canguilhem's observation about the nature of the organisms used for medical or biomedical research is very precious: «Within a given living species, the principal methodological difficulty concerns finding individual representatives capable of sustaining tests of addition, subtraction, or measured variation of a phenomenon's supposed components, tests instituted in order to compare an intentionally modified organism to a control organism, that is, an organism left to its spontaneous biological fate» [Canguilhem 1952/2008, 12-13].

Such a state of affairs would have an absolute ontological legitimacy, namely even outside the rooms of a laboratory, if the living forms were closed, monadic systems, but, as we said, the complexity of the living being makes it an open system, that is, an organism – as Mayr would affirm – «constituted in such a way that additional information can be incorporated during a lifetime, acquired through learning, conditioning, or other experiences» [Mayr 2004, 54]. Among these “other” experiences I consider also the continuous ones of birth of the Self and of its metamorphosis, according to the plastic character of the living being. Still, Canguilhem is very careful to note that often the object of our knowledge is not exactly what it is as a given in nature. Taking the example of the science of crystals, he emphasizes that crystals undoubtedly present themselves as a given object:

Ainsi l'objet cristal a, relativement à la science qui le prend pour objet d'un savoir à obtenir, une indépendance à l'égard du discours, ce qui fait que l'on dit l'objet naturel. Cet objet naturel, hors de tout discours tenu sur lui, n'est pas, bien entendu, l'objet scientifique. La nature n'est pas d'elle-même découpée et répartie en objets et en phénomènes scientifique. C'est la science qui constitue son objet à partir du moment où elle a inventé une méthode pour former, par des propositions capables d'être composées intégralement, une théorie contrôlée par le souci de la prendre en faute [Canguilhem 1968, 16-17].

Such a remark is crucial. The object of life sciences is not the pure vital in itself or life as such, *physei*, as Aristotle would say. Elsewhere, Canguilhem affirms that in biology now «[l]a vie est étudiée au plus près



*de la non-vie, à l'état maximum de dénuement de ses attributs traditionnels*» [Canguilhem 1977, 115]. There is, therefore, an inevitable and perhaps even in some cases aporetic discrepancy and fracture between what is for us and what is by nature and there is no doubt that living phenomena actually risk to be not protected and saved at all by the ravenousness of our cognitive desire, of our absolute claim to truth. Nevertheless, in my opinion, there is no way to absolutely avoid this danger, if not precisely by providing control tools for the totalizing and dictatorial power of the eidetics as a strong, constitutive and fruitful structure of epistemic knowledge. It is the intellectual honesty that Bachelard calls *l'engagement rationaliste* [cf. Bachelard 1972] in which, perhaps, the very role of philosophy is played according to its critical nature in its dialogue with the eidetics of life. As Canguilhem humorously affirms, «*la fonction propre de la philosophie est de compliquer l'existence de l'homme, y compris l'existence de l'historien des sciences*» [Canguilhem 1977, 139] and, I would add, of the life scientist.

## References

- Aristotle, *Metaphysics*, ed. W.D. Ross, 2 vols., Oxford, Clarendon 1924.
- Bachelard, G. [1972], *L'engagement rationaliste*, Paris, PUF.
- Bachelard, G. [2002], *The Formation of the Scientific Mind. A Contribution to a Psychoanalysis of Objective Knowledge*, transl. M. McAllester Jones, Manchester, Clinamen Press. (Original work published 1938)
- Blumenberg, H. [1983], *Die Lesbarkeit der Welt*, 2<sup>nd</sup> ed., Frankfurt a. M., Suhrkamp.
- Blumenberg, H. [2007], *Theorie der Unbegrifflichkeit*, Frankfurt a. M., Suhrkamp.
- Blumenberg, H. [2010], *Paradigms for a Metaphorology*, transl. R. I. Savage, Ithaca, Cornell University Press. (Original work published 1960)
- Blumenberg, H. [2012], *Wirklichkeiten in denen wir leben*, Stuttgart, Reclam. (Original work published 1981)



- Bodei, R. [1984], *Il libro come metafora del mondo*, in: H. Blumenberg, *La leggibilità del mondo. Il libro come metafora della natura*, ed. R. Bodei, Bologna, il Mulino, ix-xxv.
- Brentano, F. [1975], *On the Several Senses of Being in Aristotle*, transl. G. Rolf, London/Berkeley/Los Angeles, University of California Press. (Original work published 1862)
- Canguilhem, G. [1968], *Études d'histoire et de philosophie des sciences*, Paris, Vrin.
- Canguilhem, G. [1977], *Idéologie et rationalité dans l'histoire des sciences de la vie. Nouvelles études d'histoire et de philosophie des sciences*, Paris, Vrin.
- Canguilhem, G. [2008], *Knowledge of Life*, transl. S. Geroulanos and D. Ginsburg, New York, Fordham University Press. (Original work published 1952)
- Carey, N. [2012], *The Epigenetics Revolution. How Modern Biology is Rewriting Our Understanding of Genetics, Disease and Inheritance*, London, Icon Books.
- Carroll, S. B. [2005], *Endless Forms Most Beautiful. The New Science of Evo Devo and the Making of the Animal Kingdom*, New York, Norton.
- Cusinato, G. [2018], *Biosemiotica e piscopatologia dell'ordo amoris. In dialogo con Max Scheler*, Milano, FrancoAngeli.
- Delbrück, M. [1971], *Aristotle-totle-totle*, in: J. Monod and E. Borek (eds.), *Of Microbes and Life*, New York, Columbia University Press, 50-55.
- Eigen, M., Winkler, R. [1975], *Das Spiel. Naturgesetze steuern den Zufall*, München, Piper.
- Fusco, G., Minelli, A. [2010], *Phenotypic plasticity in development and evolution: facts and concepts*, in: *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365 (1540), 547-556.
- Goethe, J. W. [1950], *Gedenkausgabe der Werke, Briefe und Gespräche*, ed. E. Beutler, Bd. 1, Zürich, Artemis.
- Goethe, J. W. [1952], *Gedenkausgabe der Werke, Briefe und Gespräche*, ed. E. Beutler, Bd. 17, Zürich, Artemis.

- Goethe, J. W. [1988], *The Collected Works*, vol. 12, *Scientific Studies*, transl. D. Miller, Princeton, Princeton University Press.
- Goethe, J. W. [2000], *Hamburger Ausgabe in 14 Bänden*, Bd. 13 *Naturwissenschaftliche Schriften I*, ed. D. Kuhn and R. Wankmüller, München, Deutscher Taschenbuch Verlag.
- Heidegger, M. [1993], *Sein und Zeit*, Tübingen, Max Niemeyer. (Original work published 1927)
- Heidegger, M. [1996], *Being and Time*, transl. J. Stambaugh, Albany, SUNY. (Original work published 1927)
- Husserl, E. [1983], *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy. First Book: General Introduction to a Pure Phenomenology*, transl. F. Kersten, The Hague, Martinus Nijhoff. (Original work published 1913)
- Husserl, E. [2012], *Husserliana*, Bd. XLI, *Zur Lehre vom Wesen und zur Methode der eidetischen Variation*, ed. D. Fonfara, Dordrecht/Heidelberg/London/New York, Springer.
- Jacob, F. [1970], *La logique du vivant. Une histoire de l'hérédité*, Paris, Gallimard.
- Malabou, C. [2009], *Ontologie de l'accident. Essai sur la plasticité destructrice*, Paris, Léo Scheer.
- Marion, J.-L. [1989], *Réduction et donation. Recherches sur Husserl, Heidegger et la phénoménologie*, Paris, PUF.
- Marion, J.-L. [1997], *Etant donné. Essai d'une phénoménologie de la donation*, Paris, PUF.
- Marion, J.-L. [2001], *De surcroît. Etudes sur les phénomènes saturés*, Paris, PUF.
- Marion, J.-L. [2005], *Le visible et le révélé*, Paris, Cerf.
- Mayr, E. [2004], *What Makes Biology Unique? Considerations on the Autonomy of a Scientific Discipline*, Cambridge/New York, Cambridge University Press.
- Monod, J. [1972], *Chance and Necessity. An Essay on the Natural Philosophy of Modern Biology*, transl. by A. Wainhouse, New York, Vintage Books. (Original work published 1970)

**Keywords**

Form; Plasticity; Individuality; Contingency; Living Being

**Abstract**

Saving living phenomena means saving their contingency, their plasticity, their individuality. A fruitful dialogue between metaphysics, phenomenology and morphology can be of help to investigate the ontological question of form, giving us the possibility to investigate the question of form and its epistemological significance providing a revision of that eidetic approach which instead is in danger of losing the sense of the continuous plastic morphogenesis of living beings.

Rosa Maria Lupo

Dipartimento di Scienze Umanistiche, Università degli Studi di Palermo

E-mail: [rosamaria.lupo@unipa.it](mailto:rosamaria.lupo@unipa.it)

## SALVATORE TEDESCO

*META-IDENTITÄT / UNSTABLE IDENTITIES:  
TOWARDS A PLASTIC MORPHOLOGY*

In the course of his investigation into the conditions of “making literature” in our time, in a confrontation that from time to time he turned to the alchemical principle of *mutatio mutationis* which crosses the pages of Elias Canetti [Sebald 1972, 280], to the shamanism of Herbert Achternbusch [Sebald 1983], to the animal tales of Kafka and to the «Attempt at a metamorphosis» [Sebald 1986, 195] which finds expression in them, and also to the *totemic mimesis* that characterize the psychopathological poetry of Ernst Herbeck [Sebald 1992/2006a], Sebald has repeatedly and circumstantially referred to Rudolf Bilz’s psychological theories and paleoanthropological studies [1940; 1962/1981; 1967; 1971/1973; 1971/1974].

Sebald’s morphological gaze intends to develop literary images almost in a “stratigraphic” sense or as an «interlinear version» [Sebald 1986, 197],<sup>1</sup> recognizing in the sequence of evanescent forms, refractory to any taxonomy [Sebald 1996/2006b, 185], which characterize the writing of our time, a profoundly ambivalent sign, symptom on the one hand of the progressive loss and deprivation suffered by life, anticipation on the other hand of the possible overcoming of that same event of defeats.

This is a metamorphic principle exemplary at work, according to Sebald, in Kafka’s animal tales, in which the progressive installation of the human or mechanical element in the animal life mobilize and make the boundary between the forms evanescent, revealing the whole history of living forms such as the attempt «to counteract the fundamental tendency towards entropy by implementing more and more elaborate systems» [Sebald 1986, 198], and thus relativizing the human position

---

<sup>1</sup> All the quotations in this paper, except those from Sebald 1990 and Malabou 2009/2012, are my translation.

and its supposed privilege (in this light the *Report to an Academy* appears as «commentary on the precarious situation of humans as it appears from a physiologically different state» [Sebald 1986, 196]).

But there is perhaps more, and it is precisely the dynamic matrix of that “plastic morphology” that I would like to try to develop in these notes. In fact, the reader of Kafka’s tales cannot escape, first of all, that the sequence of events narrated corresponds to the intrinsically paradoxical articulation of an attempt at liberation traced back to its own physiological and sensorimotor foundations: «By following the dog on his excursions, we, the readers, begin to understand that his erratic actions – and analogously our need to act, which obviously can never be appeased – correspond less to a metaphysical need than to constituting an attempt to get out of the physical jail of our kind» [Sebald 1986, 195].

On the other hand, it will be observed that this effort to break free is morphologically configured as «attempted metamorphosis initiated with the decision to self-destruction» [Sebald 1986, 195], where evidently for Kafka and Sebald the element of the “decision” counts not so much as the expression of some *intentionality* but rather insofar as it itself provides *the initial motor impact* of the morphological event.

The destruction of the «psychological and physiological requirements of his own existence» [Sebald 1986, 195] thus becomes the paradoxical prerequisite for the investigations conducted by the animal that has “disengaged” from its biological species, but at the same time becomes («because of its specific constitution» [Sebald 1986, 194]) the condition of Kafka’s narration, and the premise for the reception by the reader, called precisely to continue, so to speak, the same operation of plastic dissolution of his own identity as the deepest and most ambivalent point of a «natural history experiment» [Sebald 1986, 195] whose saving power is manifested only in destruction [Masini 1984/2010, 161-170].

In articulating together this morphological dynamic and this “natural history experiment”, we said, Sebald refers to the thought of the paleoanthropologist and psychopathologist Rudolf Bilz and to the reflection he developed over the course of several decades on identity, hominisation, metamorphosis.

Profoundly and durably influenced by the biotheoretic thought of Jakob von Uexküll and direct pupil of Viktor von Weizsäcker in Hei-

delberg in the late 1920s [Peters 2003, 33], in that constitutive phase of anthropological medicine which constituted a moment of profound interaction between biological knowledge and Freudian psychoanalysis, Rudolf Bilz understands the formation of human identity as a conflictual place in which the tensions that cross the relationship between the organism and its vital environment come to manifest, in which the semiotics of organic symptoms finds expression in a real *scenic semantics* [Bilz 1940, 37-42]. In short, there is a profound interaction, a fundamental homology of function, between the conflicts that pass through the personality and determine its constitution and the relational game that is established towards the outside. The body is the site of this battle.

Rudolf Bilz titled *Pars pro toto* in 1940 the most mature result of his research, in which precisely a “synecdoche” relationship is established on the level of psychophysical unity between organic functions and the configuration of affections in the human soul. The place where these dynamics unfold is what Bilz [1940, 58] calls the «*scenarium vitale*» of the human being. In this perspective, the crisis, the forced restructuring which the inner and relational universe of the living being undergoes in disease, becomes a fundamental methodological interpretative key.

The scene of crisis and change, what Viktor von Weizsäcker [1926/1987a, 25] called «a kind of methodical primal scene», now takes the place where previously there was trust in the transcendental unity of an “I” that could be at the basis of a subject’s very relationship with a world, confidence in the description of a system of logical and “*erkenntnistheoretisch*” assumptions that preside over human knowledge and action, and together with this theoretical attitude even the possibility of defining safely a genealogy, an organic genesis of subjectivity.

Approaching a *Stufenlehre*, a theory of the degrees of psychic life that – in a very significant way – finds its explicit grafting point in Freud’s psychoanalysis, Weizsäcker [1926/1987b, 73] proposes to begin the analysis first by considering the vital constraints (*vitale Bindungen*) of the person; this is where Weizsäcker’s reinterpretation of the drive (*Triebe*) analysis proposed by Freud is rooted. It is an analysis that, in Weizsäcker’s work, is primarily concerned with a decisive methodological and topological aspect, constituted by the reversal of the traditional “hierarchy” between drives and contents of consciousness: It is

«the drive that gives certain contents to consciousness, and the sense of consciousness becomes comprehensible through the drive» [Weizsäcker 1926/1987b, 73]. What emerges unequivocally through this reversal is a double assumption: on the one hand «the discovery [...] that even our consciousness is not autonomous, it is not “mistress in her house”» [Weizsäcker 1926/1987b, 77], and as a consequence of this on the other hand – and this above all characterizes Freud’s Weizsäckerian recovery – the shift of emphasis towards the *Bindungen*, the “constraints”, we could say “being bound” of the living being to others living beings and the environment. In the following, not surprisingly, Weizsäcker will describe the dynamics of this level speaking of a «symbiotic existential layer» [Weizsäcker 1926/1987b, 88].

Plasticity of drives and constraints of the living being refer to each other. Phenomenologically understood in its *relational* and therefore inevitably *dynamic* and *plastic* essence, the bond between the human beings, even before being defined in the context of some gnoseology or epistemology, is an *emotional-expressive* bond [Jacobi 2014].

The centrality of the body traversed by the conflict pushes us to redefine identity in a dialogical and metamorphic sense, in its becoming other and being open to the other. For Weizsäcker, it is precisely the “biographical method” of medical anthropology that guides us towards the image of a multiple identity; for Bilz [1940, 252] our own body is the place of a “*Meta-Identität*”, plural and metamorphic, in which conflict and crisis designate the deep caesura that passes through the human being, constituting his particular resource.

In contrast to the determinism of the sense physiology and of the nineteenth-century psychophysical approach, in Weizsäcker’s vision the plasticity of organic nature finds expression in its ability to substitute functions lost as a result of trauma and disease, restoring and reconfiguring the unity of the living being through a functional change (*Funktionswandel*) that Weizsäcker conceives as a principle of interpretation of biological events in their qualitative connotation and in their development in spatial and temporal relationships and which affects both the sensory functions and those properties of the nervous system that his neurological research leads him to highlight [summarized Weizsäcker 1940/1997].

In Bilz's [1940] psychopathological perspective, the restructuring of the sensory functions and of the spatial-sensory order that they preside is associated not only with the plasticity of the *Affekte*, that is to say instincts and drives, and, in short, of the entire human affective world, but also implies an homologous metamorphic propensity for the reciprocal and motivated replacement of formal configurations (*Gestaltwandel*), as precisely what is given to study through the figures that present themselves on the scene that occurs in obsessive-compulsive neurosis.

Bilz [1940, 253-258; also Bilz 1971/1973, 1971/1974; see Peters 2003, 86-88] will propose to study these functional and formal connections starting from the phenomenological consideration of their sensorimotor aspect, calling them *Identische Exekutive*. Bilz theorises the existence of *biologische Radikale*, that is, of innate dispositions to certain "biologically relevant" experiences, actions and reactions, which in the course of human evolution, precisely by virtue of the biomorphological disposition to functional change, would have given rise to behavioural modules that can be activated for the resolution of problems, which would gradually be managed on a conscious level. Thus develops an inner spiritual world in which *Identische Exekutive* – I would translate "identical executive models" – act according to a level that is structurally homologous to the biologically founded "*urszenisch*" vital one. Between the different levels there is an «execution-mimic identity» [Bilz 1940, 253]. These are therefore levels characterized by the repetition of their ancestral foundation and yet endowed with a plastic ability to transform and build an autonomous inner world.

Meta-identity is therefore the relational lived body, the way in which it experiences an intimately multiple vital scenario in ever-changing imaginative forms and functional investments.

Bilz's paleoanthropological research [1971/1973; 1971/1974] will only project this spatialisation of somato-psychic dynamics into an evolutionary scenario, identifying for that "original scene" and "scenic semantics" a sort of founding event, an "ancestral evolutionary scenario" for the construction of compensatory mythologems.

In my view, neither the theoretical stability of Bilz's operation nor the legitimacy of this sort of narrative retranslation of the methodical space of the crisis and functional change described by Weizsäcker is here the main



point of the matter; we are more interested in examining its dynamics on a purely morphological level, that is, rather on the methodical level of the description of the plural identity than on the genetic one of a paleo-history.

Viewed from an evolutionary perspective, the human being is for Bilz [1971/1974, 278] the result of a «disaster of unimaginable scale»; having lost the original predetermined harmony proper to its ancestors, the human being seeks a compensatory path in the creation of “mythologemes” capable of founding new conditions of harmonization. Having lost harmony with reality, having lost coherence with the environment/*Umwelt* that characterizes animal life (the lesson of the already mentioned Uexküll is very strong here), the human being reinvents himself as a “poet (*Dichter*)”, or more exactly «forger of subject-centric fantastic associations» [Bilz 1971/1974, 278].

Mythologemes are nothing more than these “narrations”, these verbal configurations aimed at “crystallizing” in reality as compensatory orders resulting from a centering on subjectivity that emerges in a striking way in the conditions of delirium typical of psychopathologies, but which actually make body with the identity or meta-identity organization of the human being as such.

*Corriger la fortune*, Bilz will say with a famous figure of Lessing (Minna von Barnhelm, IV, 2); the human being is a cheater (*Falschspieler*), a delusional animal that definitively lost the original health of the animal builds a fictional universe of meanings in which the same emotional misery of the human being finds expression, compensation and nourishment at the same time. It is decisive that in this way the human being is able to represent himself a perfection whose degrees far exceed what we are given to experience: «there is a trend in us towards the over-optimal» [Bilz 1971/1974, 280].

In this sense, the articulation of a system of mythologemes is a sort of adaptive response of our complex emotional balance to a situation that presents itself without viable exit routes (*Ausweglosigkeit*). It is a profoundly ambivalent adaptive response, because precisely those figures who are thus called to guarantee human life exposed to the greatest risk in a substitute way nail it on the other hand to the system of meanings thus produced: «if the subject dies in a situation of hopelessness, it dies from the meaning (*an der Bedeutung*)» [Bilz 1967, 244].

Here is the twofold nature of mythopoietic constructions, moreover captured with extraordinary precision by Franz Kafka [1920] in a passage which will be remembered by Hans Blumenberg [1979, 9]: «They [the Greeks] could not think the decisive divine far enough away from them, the whole world of the gods was only a means to keep the decisive thing away from the earthly body, to have air to the human breath».

Recognizing in this situation one of the characteristic moments of the process of becoming human, Bilz has devoted the greatest care to investigate this situation of “Hopelessness” both in its sensorimotor components and in its psychopathological manifestations.

Still here, and eminently, the interpretative model proposed by Bilz refers to the theoretical coordinates that we have tried to delineate, and therefore to a biological-relational interpretation of the sense-motor spectrum of the human being, deeply influenced by the lessons of Uexküll and Weizsäcker and, coherently with the latter, it pays particular attention to the plural dynamics that traverse organic forms and their functional systems.

If in fact from a physiological point of view fear (*Angst*) is always an emergency reaction characterized by the release of high levels of adrenaline, Bilz says here referring to the fundamental researches of Walter B. Cannon [1915], the coordination between the same physiological reaction and motor expressions can occur in different ways, in relation to the different meanings that the biological subject experientially binds to it: «Experience, connected with a subjective “interpretation”, that is with a “meaning” [*Bedeutung*], decides which motor expression is manifested in the given situation» [Bilz 1967, 244]. It is hardly necessary to observe that here the concept of “*Bedeutung*” is explicitly assumed in the sense of Uexküll [1940], therefore as a relational investment between an organism and a specific element of its environment.

Physiological stimulation, relational meaning and motor response are therefore in a complex and mobile interaction; the peculiarity of the human situation lies precisely in a *specialization towards the extreme*. Precisely this makes the human being, as Hans Blumenberg [2006, 565] will observe, «an extreme fear being», and precisely because «he “specializes” in ways out of extreme situations, the threshold of absolute “hopelessness” is extremely high for him». Hence the complex

sequence of Kafka's *Hungerkünstler*, and those who populate modern literature from Adalbert Stifter to Thomas Bernhard, the subject of Sebald's investigations.

Bilz [1940, 214] would say that the absence of escape routes, crucial therefore in constituting the sensorimotor scheme and the imagination of the human being, is crucial in the creation of this double "feeling" («*hautästhetisch und seelisch*», Bilz [1940, 214]). The ancestral scene of finding himself in the savannah landscape is crucial for Bilz, where the escape route towards the top, towards the top of the trees, practiced by the phylogenetic ancestors of man, is no longer available. Bilz [1971/1974, 291] defines exactly this as the «paleoanthropological resp. pitheanthropological disaster». Abandoned the apesian paradise of the primeval forest, the human being is constituted in experimenting «the existence in the treelessness» [Bilz 1971/1974, 291].

The impossibility of an upward escape route forces the human being to search for it in a hallucinatory way in the creation of mythologemes, which guarantee in the elaboration of a linguistic-narrative order that stability and duration that does not find correspondence in experience.

Of particular relevance, both in Bilz's perspective and in the recovery that Sebald will make of it, is the fact that such a security strategy is sought through the elaboration of an order of becoming and of the discourse that goes hand in hand with the domestication of animals: «*akinesis* in the sense of a disciplined persistence on site» [Bilz 1967, 246].

At the same time, the space of this mythopoietic event tells us of a radical human exposure to the contingency of experience, such a radical exposure that it is not content to reside hallucinatory in itself, but to open itself precisely to human meta-identity, to the duplicity of feeling and to the bond of the living beings, and therefore to that form of the understanding of the interconnection between things that says their distance and thus "measures" their unrepeatable uniqueness.

The human meta-identity is then the dialogic and metamorphic space of construction of an identity in the crisis, which does not take refuge in its hallucinatory denial.

The animal tales of Kafka, indeed in the words of Sebald [1986] the *Evolutionsgeschichten* of Kafka, show us all the fragility of "becoming a human being", and precisely for this reason, rather than offering us

refuge in an illusory revocation of the mythopoietic processes, or in their progressive rationalistic overcoming, they point towards an inexhaustible horizon of research, on the basis of the postulate «that we still have to search for solutions where there doesn't seem to be any [...]. Not the possibility, the impossibility is the primary quality of our existence» [Sebald 1986, 199].

Thrown «into the labyrinth of our treeless hopelessness» [Bilz 1971/1974, 291], the human being builds his way through the labyrinth. In a note that unfortunately did not find an adequate theoretical development, Bilz mentions Karoli Kerényi's *Labyrinth-Studien* [1950]. The labyrinth is the figure of incessant research in *circumambulatio*, an incessant elaboration that gradually settles into formal configurations and ever new motor propensities.

At least two of these figures appear for our purposes with particular heuristic relief.

I refer first of all to the dance-labyrinth, to the figure in which the dancers, connected to each other with a rope, are dragged together into the *geranos*, the “dance of the cranes” according to the strange name with which this practice has spread. «All the labyrinth research», notes Kerényi [1950, 37], «had to get started on the dance». The rope leads the dancers first inside and then again outside: «The direction remains the same: at the center of the spiral, the dancer turns back continuing a movement that from the beginning revolved around an invisible center. From that moment, however, the direction was no longer that of death, but that of birth [...]; dance presents prison, but also liberation, alludes to death, but also together to life-beyond-death» [Kerényi 1950, 39-40].

Kerényi [1950, 40] reports the opinions of those philologists according to which the strange reference to the dance of cranes has a metaphorical value and a late and secondary origin, but observes: «However, let us think for a moment more on the theme of the rope. Its use seemed justified by the difficulty of executing the labyrinth figure; but isn't it true that even the most complex of dance figures are all the easier the greater the freedom of movement of the dancers? A dance of birds presupposes the possibility of freely hovering in the air». Here is the central joint.

Kerényi [1950, 41] therefore refers to a psychopathological experience of a patient who presented a case of sleepwalking with ambulatory

automation, in a situation of lucid memory. The *circumambulatio* led the patient to experience a phenomenon of “levitation”: «Those who experience it feel the impulse to rise from the ground, almost as if a strong wind hit it; it is necessary to stand firm and somehow anchor to the ground [...]. The patient was not absolutely crazy; she did not get lost, she did not “lose the thread”, and throughout the process she acted in a state of double conscience. In order not to fly away and not lose contact with this world, she clung now to the fence of the garden, now to a holly hedge». And so, Kerényi wonders to conclude: «Didn’t the rope held by the dancers from Delos and southern Italy respond to the same purpose? Or instead did it react to the two needs, that of executing the figure with precision and at the same time keeping firm? Did the *geranos* dancers also experience free flight in such a violent way that they were forced to hold each other’s hand in order to remain anchored to reality? The intensity of their experience should not be underestimated».

But still the experience linked to that sensation of levitation is connected to the production of another figure, on which Kerényi [1950, 42] still draws attention: «At the end of this *circumambulatio* she found a giant *ammonite* in the grass, and she was incredibly attracted and fascinated by it. She remained motionless to look at her, as if enchanted, without being able to take her eyes off; she had the distinct feeling that that object was exactly what she had “sought”. In ammonites one encounters the pure form of the spiral: the original form of the labyrinth».

*Geranos* and *ammonite*. In short, in the metamorphic event a method of research makes its way, in the use of the labyrinth finds expression a method of the homological relationship of forms and functions.

Yet the figure of *levitation*, the eminently Sebaldian and Nabokovian feeling of seeing the world through the eye of the crane [Sebald 1996/2006b, 188], tells us something about which the representative circle of the labyrinth designated by Kerényi reveals an internal limit that refers to an investigation supplement.

There is, so to speak, an external limit with respect to the representative circle of the labyrinth, the *geranos* dance and levitation, and this is precisely what Kerényi indicates in his study: to immerse oneself in the dark caves of death and fly away in life – as takes place in the choir of the women of the *Hippolytus* of Euripides, and above all as seen in

the leap of Sappho from the cliff of Lefkada depicted in the underground *Basilica di Porta Maggiore* in Rome, to whose mysterious meaning Kerényi [1950, 45] refers.



At the same time, however, the practice of dance with the rope and the sleepwalking experience of the patient identify, so to speak, an internal limit of the representative circle, in accordance with that observation that in the experience of levitation lived in the practice of *circumambulatio* it is necessary to hold firmly anchored to the ground. This is precisely how the “two needs” of which Kerényi speaks [1950, 42] find expression and representation, that is the need «of executing the figure with precision and [that] of keeping oneself at the same time», thus lifting and anchoring in free flight to reality, precisely that serious burden of earthly weight, that radical contingency of the human being thrown into the absence of escape routes.

In the light of what we are seeing, the strategy of Herbert Achternbusch’s shamanism reconstructed by Sebald appears to have an almost disarming linearity: «Herbert Achternbusch has actually only ever told



one story in all of his books and films» [Sebald 1983, 75]; that is, it is the story of the ritual repetition of the experience of dying [Sebald 1983, 76], which the shaman goes through in a sort of autistic monologue [Sebald 1990, 180], from time to time identifying himself with human and animal ancestors. But here, «transformation into a dead ancestor can also represent an escape from one's own existence [...]. Taking on the shape of the ancestors also represents a magical ritual of self-protection» [Sebald 1990, 181]; countless myths, Sebald adds, tell of the transformation as a way to escape those who hunt us: «Achternbusch's unstable identities reflect this strategy [...]. With every metamorphosis one starts a new life; it is incredibly easy, in this state of mind, to open up escape routes via flights of the imagination».

Therefore, faced with Bilz's diagnosis on "becoming human", the real blaze in which the morphological event is consumed in unstable identities represents the expression of a radical mistrust in the path of progress undertaken by humanity: «the fear that we are moving further and further in the wrong direction and soon will no longer be able to find the traces of our own experience» [Sebald 1990, 177]. Almost in an "obsessive-compulsive" liquidation of the vital *scenarium* of the biographical methodology of Weizsäcker and Bilz, Achternbusch's answer «is to invest all the fragments of his past that he can still get hold of with an excess of symbolic meaning – like totem pieces, they must testify to his desire not to lose anything».

Achternbusch's shamanic "response" to this primordial experience (cyclic transformations, anticipation and ritual repetition of the experience of death, animal metamorphosis and exploration of living forms and their events) thus becomes an example of the imaginative circle of an "aesthetics of resistance" made precisely by profoundly dual metamorphoses, abysmal anticipations, unexpected experiences of levitation, unhinging of narrative and linguistic links, in a constant process of disarticulation and rearticulation of the poetic language, according to what, moreover, Rudolf Bilz [1940, 252] theorized as the unstoppable exercise of a *bricolage of thought*.

No transition leads from the cyclical transformations and animal metamorphoses of Achternbusch to the *Versuch der Metamorphose* of the *Forschungen eines Hundes*, which Sebald [1986] tells us about in

the last of his essays on Kafka. The cyclical nature and the detailed possibility of a return are excluded here: the metamorphic experiment (*Versuch*) is introduced by self-destruction, by the conscious elimination of the psychological and physiological assumptions of animal existence. In this sense, it is an experiment in the natural history of form, an experiment of plastic destruction of form conceived at the same time as escape from the bodily prison of the species and irruption in a context «in which a life already condemned might still be able to continue» [Sebald 1986, 195].

Never perhaps Sebald's and Kafka's perspective of research has shown itself as pure, never perhaps the reflection on the contingency of the human being exposed in his *Ausweglosigkeit* has been pushed until it reveals itself, as here, in its substance of investigation into the form of human life in our time.

To conceive such a radical exposure to the factual nature of life, to its unpredictable contingency, and at the same time to outline a morphology of this contingent becoming, it would perhaps be necessary, as Catherine Malabou suggests [2009/2012, 17], «to think a mutation that engages both form and being, a new form that is literally a form of being».

*A radical metamorphosis*, Malabou continues, is conceivable as «the fabrication of a new person, a novel form of life, without anything in common with a preceding form». As Sebald [1986, 200] concludes: «What remains after this withdrawal treatment is the sheer restlessness of thinking, as is demonstrated in the art practiced by Kafka».

## References

- Bilz, R. [1940], *Pars pro toto. Ein Beitrag zur Pathologie menschlicher Affekte und Organfunktionen*, Leipzig, Thieme.
- Bilz, R. [1981], *Psychotische Umwelt. Versuch einer biologisch orientierten Psychopathologie*, 2<sup>nd</sup> ed., Stuttgart, Enke.
- Bilz, R. [1967], *Die unbewältigte Vergangenheit des Menschengeschlechts*, Frankfurt am Main, Suhrkamp.
- Bilz, R. [1973], *Wie frei ist der Mensch?*, *Paläoanthropologie* vol.1, Frankfurt am Main, Suhrkamp. (Original work published 1971)



- Bilz, R. [1974], *Studien über Angst und Schmerz, Paläoanthropologie* vol. 2, Frankfurt am Main, Suhrkamp. (Original work published 1971)
- Blumenberg, H. [1979], *Arbeit am Mythos*, Frankfurt am Main, Suhrkamp.
- Blumenberg, H. [2006], *Beschreibung des Menschen*, aus dem Nachlaß herausgegeben und mit einem Nachwort von Manfred Sommer, Frankfurt am Main, Suhrkamp.
- Cannon, W.B. [1915], *Bodily Changes in Pain, Hunger, Fear and Rage*, New York and London, Appleton.
- Kafka, Fr. [1920], *Brief an Max Brod* (vom 07.08.1920). Retrieved from <https://homepage.univie.ac.at/werner.haas/1920/bk20-009.htm> (Accessed 25 October 2020).
- Kerényi, K. [1950], *Labyrinth-Studien*, Zürich, Rhein.
- Malabou, C. [2012], *Ontology of the Accident: An Essay on Destructive Plasticity*, transl. Carolyn Shread, Cambridge, Polity Press. (Original work published 2009)
- Masini, F. [2010], Kafka, una distruzione che edifica, in: Id., *Franz Kafka. La metamorfosi del significato*, Torino, Ananke. (Original work published 1984)
- Jacobi, R.-M. E. [2014], Bipersonalität – eine “Umgestaltung der Metaphysik”?, in: W. Eich, R.-M. E. Jacobi (eds.), *Bipersonalität. Psychophysiologie und Anthropologische Medizin*, Würzburg, Königshausen & Neumann, 161-200.
- Peters, S.-K. [2003], *Rudolf Bilz (1898-1976)*, Würzburg, Königshausen & Neumann.
- Sebald, W.G. [1972], Gedanken zu Elias Canetti, in: *Literatur und Kritik: österreichische Monatsschrift* 65, 280-285.
- Sebald, W.G. [1983], Die weiße Adlerfeder am Kopf: Versuch über den Indianer Herbert Achternbusch, in: *Manuskripte: Zeitschrift für Literatur, Kunst, Kritik* 23 (79), 75-79.
- Sebald, W.G. [1994], *Die Beschreibung des Unglücks. Zur österreichischen Literatur von Stifter bis Handke*, Frankfurt am Main, Fischer. (Original work published 1985)

- Sebald, W.G. [1986], Tiere, Menschen, Maschinen – Zu Kafkas Evolutionsgeschichten, in: *Literatur und Kritik* 205/206, 194-201.
- Sebald, W.G. [1990], The art of transformation – Herbert Achternbusch's theatrical mission, in: Id. (ed.), *A radical Stage: Theatre in Germany in the 1970s and 1980s*, Oxford, Berg, 174-184.
- Sebald, W.G. [2006a], Des Häschens Kind, der kleine Has. Über das Totemtier des Lyrikers Ernst Herbeck, in: Id., *Campo Santo*, Frankfurt am Main, Fischer, 171-178. (Original work published 1992)
- Sebald, W.G. [2006b], Traumtexturen. Kleine Anmerkung zu Nabokov, in: Id., *Campo Santo*, Frankfurt am Main, Fischer, 184-192. (Original work published 1996)
- Uexküll, J. von [1940], *Bedeutungslehre*, Leipzig, Barth.
- Weizsäcker, V. von [1987a], Der Artz und der Kranke, in: Id., *Gesammelte Schriften*, vol. 5, Frankfurt am Main, Suhrkamp, 9-26. (Original work published 1926)
- Weizsäcker, V. von [1987b], *Seelenbehandlung und Seelenführung. Nach ihren biologischen und metaphysischen Grundlagen betrachtet*, in: Id., *Gesammelte Schriften*, vol. 5, Frankfurt am Main, Suhrkamp, 67-141. (Original work published 1926)
- Weizsäcker, V. von [1997], *Der Gestaltkreis. Theorie der Einheit von Wahrnehmen und Bewegen*, in: Id., *Gesammelte Schriften*, vol. 4, Frankfurt am Main, Suhrkamp, 77-337. (Original work published 1940)

## Keywords

Morphology; Identity; Plasticity; Anthropology; Mythologemes

## Abstract

The essay aims to investigate some developments in W.G. Sebald's poetics, explaining the foundations of a morphology starting from the relationship with the theories of Viktor von Weizsäcker and Rudolf Bilz. The anthropological model elaborated by Rudolf Bilz, between the study of the origin of mythologemes and the investigation of unstable identities, allows us to investigate the presence in Sebald's work of some

decisive authors of modernity. In this way the proposal of a plastic morphology is outlined in its relationships with an unstable and multiple concept of identity, and in the very original resumption by Sebald of some mythological themes that finds expression in it.

Salvatore Tedesco  
Università di Palermo  
Dipartimento di Scienze Umanistiche  
E-mail: [salvatore.tedesco@unipa.it](mailto:salvatore.tedesco@unipa.it)

ANDREA ZHOK

IDENTITY, FREEDOM, EMERGENCE.  
A REFLECTION ON THE MEANING OF ACTION.

TABLE OF CONTENTS: 1. *On natural evolutionary history*; 2. *On cultural and civil history*; 3. *On personal history*.

In *Notebooks for an ethics*, Jean-Paul Sartre confronts an apparent *l'aporia* in human action through history [Sartre 1992, 27-28, 46-47]. If history is guided by an immanent impulse, by a pre-defined address (a binding ‘teleology’, for instance), then human action and its choices do not seem to be in a position to represent anything meaningful, since their contribution is illusory. They never change anything essential in my life and are immaterial as to the course that history is going to take. If, on the opposite, we assume that each human being is wholly free, perfectly independent from his/her past and from any meaning conveyed by history, then again human action seems to be meaningless and immaterial. It is meaningless because there is nothing that can really guide it. It is immaterial because the others’ actions that will follow ours, being wholly independent of what preceded them, will not be tied to anything that we may have done before.

Such aporetic situation depends on conditions that seem quite favourable to confer meaning to action, that is, the availability of *ontological freedom*. In fact, if we were living in a Laplacian deterministic universe, it would be a fortiori impossible to talk of the meaning of choices and actions. The picture that Sartre presents is such that the very conditions required in order for actions to be meaningful turn all actions into meaninglessness.

In the following, we will try to give an answer to this aporetic picture, by staging the general outline of how an act can be both free and meaningful in a historical dimension.

*All* human action is meant to produce a change. It may be a change that restores known balances, as in the circularity of the fulfilment of

bodily needs (hunger and satiation, for instance). Or we can have to do with changes that address unknown outcomes, as in the desire to overcome a condition of unease, while ignoring what exactly could satisfy such unease. The argument that we want to briefly develop sketches the profile of the *transformational logic* inherent in human action as such, that is, the way in which actions position themselves in a historical process, both by affecting it and being affected by it.

The general form of a developing action is an articulate temporal unfoldment, animated by preferences and ends: it is something that has the primal appearance of a *story*. The ‘atoms’ of our stories are ‘*action units*’, that is, diachronic units endowed with a minimal sense, like grasping an object or making a step. The meaning of such units is on display by watching at the horizon where they find their relevant completion. A step is part of doing the grocery shopping, a grasp is part of taking products from the shelves, both are part of the plan of my day and in the last instance of my life. The meaning of each action unit is made intelligible by its position in a ‘story’.

If we look at the comprehensive horizon where our actions take place, we can distinguish three horizons, three fundamental levels of telling a ‘story’. We have the story of our personal life, and specifically of our ontogenetic and individual development. Then we have the story provided by *civil and cultural history*, the Hegelian *Weltgeschichte*, in which the former level is embedded. And finally, at the most comprehensive level, we find the *natural evolutionary history*, within which the species *homo sapiens* and its political and cultural history find their room.

Those levels (personal, cultural, biological) can be conceived as convergent and cooperating in each individual action and in its transformational process. What characterizes a ‘story’, in contrast with mere mechanical courses, is the implicit reference to *preferential and selective orders*. In fact, in a mechanical course, devoid of reference to living consciousness, there is not even a clear reason for granting a substantial asymmetry between past and future, since there is properly *no present at all*. *Present* is only what is *present to* somebody, to a consciousness, a subject, a living being that exercises its preferences. There is no chance to define ‘presence’ without reference to a living consciousness.

When we tell a story, even the ‘big story’ of natural biological history, we implicitly refer to *telic* orders, that is to orders, which are ‘*oriented towards*’, without having necessarily any representational awareness of specific ends. According to this telic attitude, *something makes a difference for somebody*, for a consciousness or a plurality of conscious individuals. Here ‘action’ is tantamount to current consciousness that prefers and postpones by means of bodily motions. Now, we are going to sketch out a general framework of how meaningful action can develop, starting with the most comprehensive dimension and proceeding down to the personal sphere.

### *1. On natural evolutionary history*

Nowadays the natural history of the living is described in evolutionary terms, according to a well-known Darwinian model, which can be essentially summarised through two passages: a) different living forms – different phenotypes – are generated from genotypes emerged from casual genetic variation; b) natural selection operating on phenotypes changes their rate of reproduction, thus affecting future genotypes.

This process is often conceptualized in a misleading way, as if it showed that natural selection *explained* phenotypic traits, that is, as if it explained the *nature* of living properties. This vision depends on an erroneous adaptationist interpretation of the evolutionary course.

According to an adaptationist reading, a reference to greater adaptive power is sufficient reason to provide causal explanations of all the phenotypic traits that we meet in nature. Yet, as S. J. Gould has effectively argued [Gould & Lewontin 1979], adaptationism makes claims that are inadequately justified. Such claims are *conceptually* mistaken precisely insofar as they assume to explain the *essence* of biological properties by resorting to the adaptation mechanism and therefore to natural selection. But in fact natural selection *creates nothing*, since it operates as a kind of *veto* or *ensorship* towards the powers already predisposed by genetic variation, that is, by life in its spontaneous formation. Selection always plays with cards that are provided by the powers inherent in living matter. This is evident if we notice that natural selection always already presupposes a genotype and the relevant phenotype

on which to operate: selection works *on* life, it does not constitute life.<sup>1</sup>

In this respect, it may be useful to think of the whole content of our biological faculties from a point of view that overturns the usual perspective. Each faculty of ours, each phenotypic trait with its capabilities, depends on a genetic configuration that was *not shaped* by natural selection: we just inherited them from our parents. But this can be said also for the biological faculties of our parents, which simply inherited them from theirs, without natural selection having anything to say. And this is true by going backwards for each generation. Every present living being – each one of us – is simply the last instantiation of a successful chain of genetic variations (and their coupling), from a hypothetical ordinary single-celled eukaryote till now. On the content of this chain natural selection had nothing to say, since its authority has been exercised just on the ones that have been taken off the board. All characters that define what we are derive without exception *directly* from spontaneous developments of life.

What evolutionary theory tells us is that selection worked by changing the *probability* that some genotypes combined, insofar as it erased a vast number of possibilities from the scene; and this defines the *adaptive* character of this or that phenotypic trait. However, what each living being can do is exclusively determined by an endogenous process of living matter (and, we could say, of *matter* as such).

From this point of view, we can see that each description of biological evolution could be properly conceived as an evolution *within matter*, whose properties gradually *emerge*. This perspective may sound eccentric or metaphysical, but in fact is just the simplest way to describe from a philosophical point of view what evolutionary biology expresses in its prevalent doctrine.

Here it is important to grasp correctly the meaning of the term “emerge”. Biological properties *emerge* neither in the sense that they

---

<sup>1</sup> In “The free floating rationales of evolution”, Daniel Dennett [2012] formulates a hypothesis concerning a possible extension of the mechanism of natural selection to the emergence of life, starting from self-replicating chemical cycles. Yet, this hypothesis can be shown to be untenable, because it is lacking in a crucial requirement of evolutionary process: there is no reason why successfully self-replicating chemical cycles should spread their traits by increasing in number [cf. Zhok 2017, 201-203].

are created *ex nihilo* nor in the sense of being independent from the qualities of the material substrate in which they inhere. Each *emergent property* represents a potentiality of acting and producing effects, and such a property primarily depends on the *configuration* of the parts of the agent (i.e., the living). Secondly, the properties *manifest* themselves at the meeting point between the configuration of the living and the beings to which it relates (the surrounding world, the *Um-welt*). A property is attributed to a being only when both a certain *configuration* of its parts and a certain *surrounding world* are given.

What defines the *emerging* character of these properties is that they manifest themselves in settled relational forms: in specific environmental relations and in specific internal relations of their parts (configuration). Properties appear therefore as *emergent* because they are not reducible to the properties displayed by simpler configurations or in different environmental relations.<sup>2</sup>

In this sense, the properties of matter are properly always ‘emergent’, insofar as *before* empirically discovering what potentialities a material configuration features in certain relations with the environment, they cannot be anticipated. They cannot be *inferred* from what has appeared in different configurations and in different relations. Therefore, we cannot *deduce* the properties of the wholes from the properties of the parts.

In this sense the properties of the living are emergent, that is new and irreducible to those of the non-living; and similarly the properties of consciousness are emergent in relation to the biological ones, without it implying anything ‘irrational’ in natural processes. To regard the simpler configurations as a normative canon for the more complex configurations is just a metaphysical prejudice, which originates in methodological instances devoid of ontological significance. Attempts of conceptual reduction of complex to simplex have been, and still are, a powerful methodological instance, effective as theoretical instrument, and therefore massively adopted by modern science. However, nothing in our experience justifies its translation into an ontological statement.

Therefore, the only way in which the nature of a property can be grasped is by looking at *how its implications unfold*; the only way to un-

---

<sup>2</sup> For a wider account of the character of emergent properties we refer the reader to Zhok [2011].



derstand the properties of a phenotypic trait, of a genotype, of a species, is to *explore what it is currently able to do*, and not to investigate (or conjecture about) its antecedents. Knowledge of the antecedents can be useful to anticipate the essence of a configuration only if we have made previous experience of regular connections between those antecedents and some consequences. But this is necessarily *a posteriori* knowledge, which depends on the specific traits of natural configurations and their irreducible properties.

The new qualities emerge from the stage defined by old qualities in a specific sense: not in the sense that the old *causes* the new, but in the sense that the old *creates the space of possibilities* where the new can take place. This is well represented by the evolutionary dynamics of *exaptation*, as it was developed by S. J. Gould [Gould & Vrba 1982].

In each moment a phenotypic trait can have a well-defined function, or it may have none, while being ‘collateral’ to another functional trait, or it may be an originary morphological trait (part of the organism’s *Bauplan*), or, finally, it can be an atavism, that is, a residual of past functions currently devoid of any function. Whatever the reason for its current existence in an organism, be it functional or not, in any case it is its *future use* that is going to define its biological *meaning*. And such use may have nothing to do with the reasons that had possibly determined its existence in a certain present (provided that reasons there were). This argument can be applied to each moment of intermediate development in the life of a species (and, of course, also to the *first* instance of organic life as such.)

The logic that emerges from these remarks on the nature of acts that take place in a historical course (here an evolutionary one) is the following: the past, as it is expressed in each present, does not *determine* the future. It expresses itself by defining *spaces of possibility* where some options are open, other ones are closed, some are likely, other less likely. The borderline case is the one where the present shuts down all future possibilities (biologically: extinction). In all remaining cases we have a *modulation* of future possibilities, a modulation which in natural history, once we exclude divine interventions and Lamarckian mechanisms from the explanatory options, is a *causal* modulation.

This process should be understood as a course of events where each

act of the living intervenes on a flux of *possibilities* by modifying their *probability*. The essential form of the process is such that the identity of an individual and its species, in a certain moment, has only possible empirical causes to exist, but the *causes* that explain its existence are not tantamount to the *reasons* able to explain its essence. Such an essence, which amounts to the capacities, powers, faculties of the living, is not knowable on the basis of their (real or conjectural) causal history, but only by examining *what can be brought to light* by it (the unfoldment of its implications).

This conceptual framework could be defined ‘*existentialist*’, in a specific acceptance, insofar as here *existence precedes essence*, insofar as the ‘*that*’ precedes and grounds the ‘*how*’.

The interpretations of evolution in adaptationist terms conceal this fundamental character: before each phenotypic trait, before each faculty or power, they pre-set the same explanatory clause, such that each trait of the living expresses in the last instance its utility for survival. This reading produces a dramatic impoverishment of our reality, as it manifests itself. Saying in the face of our enjoyment of Mahler’s symphonies, or Horace’s *Carmina*, that the faculties, capabilities and propensities that are thereby expressed are just expressions of functions apt to enhance our survival creates a barrier to grasp any relevant meaning. Such a meaning does not manifest itself by knowing the past of those faculties but by acquaintance with the present and future play of its manifestations.

The process that links together past and future on the stage of evolutionary history is conceivable as a process of progressive *possibilizations*, which take place within previous spaces of possibility. Biologically, the crucial act, the possibilizing action par excellence, is the *mating* act, with the relevant *crossing over* and the possible spontaneous variations. It is this act that defines the *present*, around which past and future gravitate. It does so, in the wake of the inherited genotype and its potentialities, and by generating a *new horizon of possibilities* downstream.

## 2. *On cultural and civil history*

Let us try now to move to the stage of *human history*, which always presupposes the outcomes of natural history and is grafted into it.

The biological characteristics of human species are such that their forms of interaction with the environment and with members of its own kind are massively influenced by what is learned from one's cultural surrounding. For each specimen of *homo sapiens* the culture where one is born and grown is something given, something devoid of reasons and further justifications. In this sense, one's own cultural background manifests itself in a way that is analogous to the relation that the genotype has towards the specimen itself. Here, the horizon of what is valuable or not is *defined by what one is* and cannot find any justification outside of its species-specific determinations. For a specimen of *homo sapiens* empathy is a valuable feature, characterizing and functional, but of course it would make no sense to judge empathy as something intrinsically 'good', or 'bad', for instance in the existence of a lichen, or a scorpion.

Let us call the cultural chunks that rule over social action – like customs, institutions, collective habits – '*éthos units*'.<sup>3</sup> When *éthos units* emerge, they have potentialities that are not knowable a priori. Specialized scholars (anthropologists, sociologists, etc.) may sometimes take advantage of settled experiences in order to foresee how a social group can change by adopting a specific *éthos unit*. This knowledge, however, is not already available when these units come first to light: their potentiality must be explored through historical praxis.

Here cultural evolution shows interesting analogies with biological evolution. In historical course, each novel *éthos unit* is the analogon of a new genetic configuration. As genetic configurations, also rules and collective behaviours are born for reasons that are mostly unknown and not further justifiable. The *éthos units* are put to the test historically, and they spread if they allow the relevant groups to work and thrive. This is

---

<sup>3</sup> The Greek term *éthos* (ἦθος), which originally meant a place where to live, over time has taken the meaning of shared 'disposition', 'character', 'temperament', and in the last instance 'code of collective behaviour'. It is in this last acceptance, which has been absorbed by Hegel's 'objective spirit', that we are going to use here the term.

a model of social ordering that is suggested by Friedrich von Hayek in the first part of *Law, Legislation and Liberty* [Hayek 1998, 35-55].

The *éthos units* that turn out to be functional, and that allow the social reproduction of the group, define an ‘*ethical*’ *standard*, that is, a configuration of legitimate customary behaviours, which are *prima facie* proposed as models to be followed. The ordering promoted by the *éthos units* can freely change and diversify, with the only mandatory limit that it must not conflict with ‘species-specific virtues’, that is, with essential biological traits. There is no absolute standard of goodness or badness for a custom, insofar as it does not clash against the instances promoted by the evolutionary history of the species that adopts the custom (i.e., the human species).

Here there are two main differences between the genetic and the cultural configuration: the first one concerns their *temporal extension*, the second one concerns what we call *possibilization*, or *possibilizing action*.

As to the first point, social rules, customs and cultural trends unfold over shorter times than phenotypic traits. Thus, communitarian orderings combining education and coercion in sight of intersubjective coordination are as old as the first human communities. Laws able to keep together social groups that do not directly know each other have developed roughly five thousand years ago. Modes of production relying on monetary coordination of individual initiatives are social orderings that have been tested just for the last couple of centuries. The more an *éthos unit* has taken roots over time, the stronger its justification in continuing to exist the way it does.

The potentialities of any social ordering manifest themselves in its concrete unfoldment, without being analysable ‘in vitro’. Each cultural and social ordering that exists and works for many generations has some good reasons to exist as it does. Effective demands of change are not just fantasized alternatives but attempts to overcome dysfunctions immanent in the current historical development. Such development is always hinging on a surrounding world, grafted into a territorial and anthropological site, and the demands for change cannot be sensibly judged without an acquaintance with that context. From this point of view, changes are justified when they try to overcome dysfunctions inherent in the existing collective *éthos*.

On the contrary, believing to be able to export forms of life, social rules, institutional orderings from one context to another, while overlooking the historical path and the territorial context of a culture, represents always a form of violence (sometimes mere inappropriateness, sometimes dramatic abuse).

At this level, a '*possibilizing action*' can be grasped at best in acts like the *definition of legislative and institutional orders*, which explicitly create the framework for a re-orientation of future practices. However, there exists also a cultural micro-creativity which is capillary, diffuse and continuous and which immanently introduces – and modifies – collective habits, social practices, tacit norms. Whatever the dimension of the possibilizing action that we want to represent, the essential point is that also here we find the same elementary logic. Current acts are not *caused* but are *made possible* by previous cultural (and biological) orders. In their turn, current acts can modify the cultural orders and, if they do it, they do it by opening new possibilities and blocking alternative options.

Mostly such possibilizing acts are not in the condition to foresee precisely what possibilities are going to be opened downstream. This is certainly true for all individual micro-contributions immanent in the history of a community, as well as for artistic and literary contributions. Acts that imply macroscopic normative changes (for instance, big institutional changes) seem to represent an exception, since they are precisely produced in order to inform future behaviours. But, even here, the reliability with which an anticipation is possible depends exclusively on previous experience in similar circumstances.

### 3. *On personal history*

If we come to the third level of analysis, the one of ordinary individual action, to begin with, we find ourselves entrusted to settled biological and cultural layers, which prepare the space of possibility within which our individual action takes place. With regard to these spaces of possibility every act of ours operates in its turn as a *possibilization*: it is conditioned by the previous spaces of possibility and it generates new ones.

In the first context (1), individual action turned from possible to real

in the dimension of the *species*. In the second context (2) it did so on the stage of a *social group* tied together by a line of cultural development. Here, in the third case, we have to do with individual agents where a pre-set sphere of possibilizations turns into reality primarily for the agent itself, which preserves its identity over time. Individual agents decide within a framework of intelligible consensus, which is defined by the community they belong to, which is commonality of biological species and cultural tradition.

Everything that counts as a *reason* for acting has always a *super-individual status*, since a reason is ideally intelligible for an indefinite plurality of (alter) egos. Actions that *do not* appeal to superindividual reasons are idiosyncratic events, like an action prompted by a momentary and extemporaneous impulse. They are events that could be unintelligible even for the agent itself in the future. Therefore, they are also impervious to *being followed*. Biological and cultural presuppositions are not efficient causes: they are *platforms of possibilities* from which a new possibilization emerges with any new action. Every single action has therefore a possibilizing character, creative of new possibilities, primarily for the course of life of the agent itself. Over the course of our life each action of ours takes charge of the possibilities that biology, culture and one's own previous choices have predisposed, and on this basis it generates new spaces of possibility. This clearly happens during the ontogenetic development, where each achievement represents the premise for further achievements. The infant's motility introduces her to the first forms of locomotion, and then of ambulation, and further of running, jumping, etc. Early intersubjective interaction prepares language learning, on which reading and writing will grow, and from then on, the subject will be able to access the whole of written culture. And the same motion will unfold for the adult person as well: each act will take on previously predisposed possibilities and in their wake new ones are going to be produced. No action *determines* the future; what an action can do is to re-orient the space of possibilities where events and future choices (one's own and the other's one) will be able to position themselves.

Each act creates new conditions where some options diminish in probability, and possibly disappear, while other ones increase in prob-

ability. A self-conscious agent expresses itself as a possibilizing event. It differs from possibilizing events of higher level, like the evolution of the species, insofar as the self-conscious agent can *anticipate* – to some extent – how the available space of possibilities will look like after performing the current action. This rational anticipation can prompt it to orient its own action otherwise and represents the primary feature of what we call *rational guidance of the action*.

\*\*\*

Now we can try to draw some basic conclusions concerning the ‘logic of action’ and its ways of transforming reality. Let us follow the temporal tripartition of past, present and future, which correspond here respectively to historical *inheritance* in a broad sense, to the *present identity* of the agent and to its future-oriented *freedom*.

Every action produces change in the status quo. With regard to the inherited space of our possibilities, our position as agents comes always fatally late. It is an *ontological* lateness, in the sense that the present position of the agent is in principle unable to revoke the conditions that posit it as agent. This means that the biological and cultural configuration, which we here and now are (our *identity*), cannot be reviewed and grasped, as it were, by rewinding the tape of our past history. In a course of events where novelty emerges in forms irreducible to what precedes it, the essence of what we are is *posited* by the past, but it is properly *understandable* only through the future, in what we are able to bring to light. The causal chain of past events that posit us does not reveal anything about our essence.

This perspective allows us to answer to the aporia mentioned at the beginning, such that our present action would be *meaningless* both if we are determined by our past and if we are absolutely free with regard to the very same past.

The first horn of the dilemma entailed the idea that the past, by deciding what we are, takes away from us the possibility to bestow meaning on our actions, since all meaning would be already included in the process that preceded and determined us. A model of this kind can be the one proposed by evolutionary adaptationism in natural history. This



perspective is saying to us that any quality, virtue or human potentiality is *nothing but* an accidental embodiment of the same and only substance: the principle of the survival of the fittest. Such a move empties qualities or virtues of their content and value. They are no longer judged for what they do and display, but in the light of their conjectural reduction to a causal history that – allegedly – produced them. However, as we have seen, the content of our dispositions, the essence of what we are and can, is *not* defined by natural selection. Therefore, the essence of what we are cannot be discovered by looking at our past causal history but by exploring the potentialities that we exhibit while acting. From this point of view it is precisely the present action, and the chain of future actions, that reveal the meaning of the agent (individual, society, species) to itself.

Now, if we take on the second horn, it seemed that the agent's freedom would destroy the very identity of the agent and its relation to the past. If I am wholly free, I can recreate myself at pleasure, I am not bound to anything, I have no essence to which I can refer, and therefore I have no reason to prefer something to its opposite. This is a perspective to which Sartre seems to incline,<sup>4</sup> a perspective where the absoluteness of freedom threatens the very possibility of grasping the meaning of one's own acts, whose gratuity adumbrates their groundlessness.

In front of the absoluteness of freedom, taking care of any inheritance of the past might seem to be senseless prejudice. Yet, this stance is untenable. The *inheritance* that defines us for what we are has an intrinsic justification, which does not require any further argument to support its *validity*. The biological and cultural configurations that we inhabit have overcome obstacles and hurdles and have thus demonstrated to be able to preserve their functionality across generations. This is, at first sight, the highest possible authoritativeness that we can tap into, and it cannot be rejected in the wake of extemporaneous conjectures or ideal imaginations. In the face of customs, settled uses, collective hab-

---

<sup>4</sup> «[...] my freedom is the unique foundation of values and [...] nothing, absolutely nothing, justifies me in adopting this or that particular value, this or that particular scale of values. As a being by whom values exist, I am unjustifiable. My freedom is anguished at being the foundation of values while itself without foundation» [Sartre 1956, 38].



its, tacit social norms, communitarian forms, educational practices, etc. we can usually say to ignore why they have been adopted, or why they are so and not otherwise. But this lack of theoretical reasons is no lack of justification: every cultural and institutional order that have come to us has always already at least something that speaks in its favour. If it came down to us (precisely like a phenotypic trait) we can say that it was enhancing, or at least allowing, social reproduction. This does not shield it from changes but circumscribes the sources legitimated to justify a change. From this point of view the agent is free, but it is also endowed with a ‘historical essence’, which defines it precisely as that kind of agent, and which depends on the previous possibilizing orders (biological, sociocultural, personal). Every agent is free, because its act is *not* univocally determined by the past, but it is also endowed with an essence, which is not justified by theoretical reasons but by its own existence as inheritor of its history. There exists, thus, an ultimate normative source provided by the biological, cultural and personal identity that each of us always already is. What such ‘essence’ is can be displayed by future actions, but *that* it exists, as inheritor of its past, is what gives a normative and foundational ground to our decisions.

Thus, the Sartrean aporia from which we started is about to disappear. On the one hand, our action is always *free* in a radical way: it does not just realise previous possibilities, but it also *originates* further possibilities downstream. Action is free insofar as it is never conceivable as mere outcome of a chain of efficient causes. On the other hand, it is free but not *arbitrary*, since it inherits the possibilizing events that in the past opened up the possibilities that we presently inhabit. Our freedom is not mere *libertas indifferentiae*, no mere availability of indifferent options, and cannot be understood, not even in principle, as gratuitous sovereign *autopoiesis*. The form of action and its transformational potential depend primarily on the acknowledgment of one’s own *identity*, which has normative value and cannot be bypassed – as if our identity were a burden to the aspirations nourished by our imagination. In universal history, as in the individual’s one, we find both the *discontinuity* of emergence, and the *continuity* of preceding possibilizations.

What we are (for ourselves) is not just a ‘fact’ but has *normative* character, that is, it defines the horizon of what we are able to desire

and how we can do it. Such normativity is never coercion, both because it provides options and addresses, no compulsions, and because we can always deny every inclination, renounce every desire, overcome every ambition. However, every choice that tries to be aware of itself must take in the normativity implicit in its actual identity and try to transform it along given lines. Even the *reasons* for trying a radical self-transformation must root in what the agent has access to, here and now, as collateral of its own identity. Every free and rational choice must therefore assume the identity, which we are bearers of and which we have never been in a position to choose, and only then we can possibly proceed to change it as variation of its spaces of possibility downstream. The identity of the existent is an unjustifiable and indubitable foundation, but its nature is not that of obligation but that of reasons for possibilizing actions.

## References

- Dennett, D. [2012], The free floating rationales of evolution, in: *Rivista di Filosofia* 103 (2), 185-199.
- Gould, S.J., Lewontin, R. C. [1979], The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme, in: *Proceedings of the Royal Society of London B* 205 (1161), 581-598.
- Gould, S.J., Vrba, E.S. [1982], Exaptation – a missing term in the science of form, in: *Paleobiology* 8 (1), 4-15.
- Hayek, F. von [1998], *Law, Legislation and Liberty*, London, Routledge.
- Sartre, J.-P. [1956], *Being and nothingness*, transl. H. Barnes, New York, Philosophical Library.
- Sartre, J.-P. [1992], *Notebooks for an ethics*, transl. David Pellauer, Chicago (IL), University of Chicago Press.
- Zhok, A. [2011], *Emergentismo*, Pisa, Ets.
- Zhok, A. [2017], *Libertà e natura*, Milano/Udine, Mimesis.

## **Keywords**

Identity; Emergence; History; Freedom; Ethics

## **Abstract**

Freedom and the meaningfulness of action are not just natural allies, as one might expect. They can be also incompatible instances, since radical absolute freedom threatens any action with emptiness and groundlessness. In the present pages we try to tackle this ‘paradox of freedom’, where actions deprived of all freedom, and actions radically free, appear both to be threatened by meaninglessness. We do so by outlining a comprehensive conception of agents’ freedom as possibilization, which reveals itself in the forms of biological, cultural and personal history, and which is capable of neutralizing the aporetic character of the ‘paradox of freedom’.

Andrea Zhok  
University of Milan  
E-mail: [Andrea.zhok@unimi.it](mailto:Andrea.zhok@unimi.it)

## MIRKO DI BERNARDO

FORM, FUNCTION AND VALUE  
 IN THE EMERGING AND SELF-ORGANIZING  
 PROCESSES OF THE NATURAL EVOLUTION

TABLE OF CONTENTS: *1. Agency and Autocatalysis; 2. Know-how, natural selection and self-organization; 3. Function, value and meaning; 4. The preconditions of ethics; 5. Development of the moral sense and emergence of symbolic thought.*

*1. Agency and Autocatalysis*

**I**n the history of scientific thought many models have been conceived in order to attempt an explanation of the mysterious process of continuous autopoiesis of every living system. Just as Kepler renewed the cognitive ideal of astronomy, breaking the circle that had led from Tolomeo to Copernicus, Prigogine and other scholars, starting in the 1970s, have contributed to breaking the circle of sufficient reason by creating a new mathematical language capable of rendering intelligible the irreversible processes and events that traditional physics had itself saved through phenomenological approximations. In recent decades, Prigogine's insights, the pioneering work of the Dutch physicist Lorentz, the study of chaotic systems, and research in the field of biological complexity theory have gradually led to precise theoretical developments that now make clearer and more visible the intricate network of relationships between dynamics, non-equilibrium thermodynamics, systems biology and information theory [cf. Prigogine & Stengers 1979/1999; Nicolis & Prigogine 1989]. When we find ourselves, for example, in front of phenomena not of pure order or pure randomness, but phenomena pertaining to forms of high organization, we actually find ourselves in an intermediate situation between the complete absence of constraints and the maximum of redundancy.

The optimum organization should therefore be seen as a real compromise between maximum variability and maximum specificity [cf.

Kauffman 1993]. A compromise which can only be articulated according to a dynamic dimension that transforms itself over time in the presence of a deep structure underlying the surface message [cf. Prigogine 1996/2014].

In *Investigations* [Kauffman 2000] and other subsequent works [cf. Kauffman & Clayton 2006; Longo *et al.* 2012], Kauffman faces these intrepid questions and finally identifies the core of the current theory of biological complexity in the key concept of autonomous agent, i.e. the basic unit of a general biology independent of the support, defined as «a self-reproductive system capable of performing at least one thermodynamic work cycle» [Kauffman 2000, 7].

An autonomous agent is a physical system that can act to its own advantage in an environment. A first intuition then is that an autonomous agent must be moved away from thermodynamic equilibrium because work cycles cannot occur at that state: the concept of agent is, in fact, itself a concept of non equilibrium.

In the beginning, it is also clear that the American scholar's objective is to highlight how the definitional circle of this notion is virtuous and therefore harbinger of a new understanding of the concept of "organization" in itself. In short, dissecting this definition will lead us into mysterious territory. Partly, the enigma concerns the answer to a precise question: what is the appropriate mathematical form to describe an autonomous agent? Is it a number, and therefore a scalar? Is it a list of numbers, and therefore a vector? A tensor? According to Kauffman, the answer is negative because the autonomous agent is a relational concept.

Living cells, in fact, inevitably appear as organized wholes. A cell is not a single type of molecule that replicates itself, but a rich web of molecular events through which that whole propagates «approximate reductions of itself» [Kauffman 2000, 43]. Then there is the metabolism, there is the activity of understanding, translation and innovation of different languages that interact incessantly with each other such as, for example, that of DNA, that of the various RNAs and finally that of proteins where the code itself is mediated by activation enzymes (aminoacyltransferases) that load on the appropriate tRNA molecules the correct amino acids in order to translate the code, a code that is able to create the aminoacyltransferase enzymes themselves. Moreover, in the

cell there is the “rustling” of energy that flows simultaneously inside, and through, what we could define as main and secondary labyrinthine pathways that connect the degradation of high energy sources to the synthesis of products that require the addition of free energy. Living cells connect endoergonic and exoergonic reactions in order to produce high concentrations of many molecular species. The link between exoergonic and endoergonic reactions is therefore essential in the definition of an autonomous agent, «that mysterious concentration of matter, energy, information, and that extra something we call life» [Kauffman 2000, 64].

In summary, Kauffman argues that autocatalysis and molecular reproduction are necessary for life, but not yet sufficient [cf. Kauffman 2003]. Life possesses deeper realities, and even more mysterious than the autocatalysis that Ghadiri and colleagues have been exploring [cf. Lee *et al.* 1997].

Well, keeping as theoretical reference the Carnot cycle and Boltzmann’s entropy, Kauffman and other scholars [cf. Hordijk & Steel 2017; Filisetti *et al.* 2012] in an attempt to probe the mysterious essence of life have recently successfully simulated the system of differential equations that correspond to the dynamics of the network of reactions of a virtual molecular agent [cf. Gillespie *et al.* 2014].

The main conclusion we draw from the simulation is that autonomous agents, by coupling one or more autocatalytic and work cycles, constitute a perfectly plausible form, although new, of an open, unbalanced chemical reaction network. Perhaps, behind the mysterious entanglement of self-organization and natural selection there is not only an additional relationship between matter, energy and information, but, as Kauffman guess, a new conception of information is emerging, a conception within which information appears as a “quality” able to generate and regulate the entire system (coextensive relationship linked to a continuous dialectical game among parts), transforming it into a living system and therefore into a cognitive system [cf. Wallace 2014].

We are referring here to the fascinating opportunity to make possible the dialogue between the mystery of the complexity of the living species and the notion of the genesis of meaning [cf. Carsetti 2012; Kauffman 2014]. The bios, in fact, in my opinion, going beyond the

merely quantitative measurement (syntactic level) of the information that is attacked through a binary logic (extensional logic), can be interpreted as an emerging phenomenon intrinsically connected to forms of cognition and intentionality (semantic level) [cf. Di Bernardo 2016], also allowing the review of some enlightening philosophical insights in modern times about the teleological principle of self-organization of living organisms.

## *2. Know-how, natural selection and self-organization*

In the introductory part of *The Metaphysics of Morals*, masterpiece of 1797, Kant gives a definition of what is meant of Life: «Life is called the faculty that a living being has to act in accordance with its representations» [Kant 1797/2006, 21, my translation].

At first it seems that this sentence refers only to subjects endowed with consciousness but if we revisit this definition in the light of Kauffman's theory of autonomous agents, some original aspects certainly emerge. For example, more than two hundred years after the brilliant words of Kant, systemic biology can only recognize the great eighteenth-century philosopher as having merited one of the main characteristics of life: cognition. But that is not all, it will soon become clear how in living organisms cognition is deeply linked to the fundamental notion of intentionality.

The autonomous agents fill the gap that separates the merely physical from that new realm of the merely physical where all living beings attribute themselves a purpose. Semantics comes into play with a purpose; at the molecular level, in fact, according to Kauffman autonomous agents are able to distinguish and select external entities by virtue of a simple chemistry that hosts symbols and signs. To an external entity, therefore, will correspond a modification of the internal state of the agent itself, a modification, that is, that will allow the latter to act in one way rather than another.

Put in these terms and in agreement with the American biochemist, know-how is another way of seeing the catalytic closures that propagate itself, the work tasks, the perception, the recording and the actions that we today recognize as intrinsic to the activities of autonomous agents.

Know-how, in fact, is not outside the processes of self-organization: know-how is the propagating organization itself [Kant 1797/2006, 153-154]. From this point of view, therefore, with autonomous agents also a glimmer of an ethical question arises because the facts are enunciated by the know-that, but the know-how as it preceded the know-that.

In fact, although aware of Hume's injunction, Kauffman believes that in the perspective of the autonomous agent the disgusting-delicious dichotomy is primary, inevitable and, for that agent, of the utmost importance. Without attributing a consciousness to *E. coli* we cannot, therefore, fail to perceive that the rudiments of value are present once autonomous agents exist [Kant 1797/2006, 154-155]. Let us return for a moment to the definition formulated by Kant. Life, understood as the faculty of acting in accordance with its own representations, not only tells us that all living beings are cognitive systems, but also tells us that these organisms act according to internal models creating always new meanings. A representation, in fact, can be read, from a phenomenological point of view, as a re-representation of something. In the term representation, therefore, the internal/external difference and thus the directionality towards the external reality perceived through modifications of the internal state to which it is possible to respond through simple actions is implicit. This tension towards exteriority, only intuited by Kant, in my opinion can be defined as intentionality not related to consciousness or internal purpose [cf. Kauffman 2008; 2016], that is to say as that process strictly connected with the gratuitousness of molecular interactions, whereby meanings<sup>1</sup> develop and, once embodied in actions, operate also allowing autonomous agents to modify to their own advantage the environment in which they live in order to reproduce themselves. Let us think for a moment of the humble *E. coli* swimming against the current in a glucose gradient. According to Kauffman, the bacterium is an autocatalytic system able to reproduce and therefore to act by carrying out one or more cycles of thermodynamic work, but it is also a cognitive system able to create always new meanings and, subsequently, to transmit them through unconscious actions [cf. Kauffman *et al.* 2008].

Bacteria and amoebas, in fact, as we well know, already manifest

---

<sup>1</sup> At this level we see that in a natural autopoietic system what is self-organizing is the function itself with its meaning [cf. Atlan & Louzoun 2007].



a learning we could say Pavlovian to use Dennet's words; these organisms, in fact, are endowed with receptors that adapt themselves on a constant level of a certain ligand signal and that perceive a change from the present level: here, then, is the outline in biology of a primitive (naturally unconscious) form of representation. Here, therefore, even if we cannot yet speak of the association between a more or less arbitrary conditioned stimulus and an unconditional stimulus, it is possible to infer that these organisms are in all respects endowed with that four billion year old faculty that Kauffman defines as know-how, intentionality not related to consciousness.

### *3. Function, value and meaning*

Therefore, at this point the genius of Kant's intuition appears clearly: life is called the faculty that a being has to act in accordance with his own representations [Kant 1797/2006]. In this definition, however, one aspect remains to be clarified. What is meant by the term "action"? Is it possible to distinguish between the actions of an autonomous agent and the mere events that take place within and around him? In an attempt to give an initial answer to this question, Kauffman [cf. Kauffman 2000] argues that the fundamental difference between what is living and what is not lies in the ability to act (agency), that is, in that process that allows the meaning to manifest itself over time. In fact, according to the American biologist, "the meaning derives from the agency" and it can be studied in nature by referring first of all to the minimum autonomous molecular agents that perform at least one thermodynamic work cycle and that have a receptor for food and poison and are also able to approach the first and move away from the second. Going back to the example of the bacterium, we can infer, according to Kauffman, that a greater quantity of glucose molecules, revealed by a receptor while the bacterium swims or orients itself in the gradient, represents a sign of greater concentration of glucose along the gradient of this sugar. That is a sign "interpreted" by the bacterium through "its oriented movement" in the same gradient.

In the meaning of Peirce [cf. Peirce 1932/1969], then, we could say that glucose acquires a meaning for the bacterium thanks to the recep-

tor of the sign for the bacterium, glucose, and by virtue of its actions: to go up the glucose gradient. The bacterium is the receiver. And in this case it was natural selection that built the molecular systems to achieve it. Without agency there can be no meaning. This is the thesis of Kauffman, interpreter of Peirce. Therefore, whatever the level of evolution in which we intend to recognize it, with the agency not only the meaning emerges in the universe, but also the values, behaviors and purposes. In fact, the evolution by natural selection acting on heritable variants contributes in a decisive way to the genealogical unfolding of the distinction between causal-functional and causal-collateral aspects of organisms<sup>2</sup>. Thus, in the ability of the bacterium to fulfill the biological function of “obtaining food”, without attributing any consciousness to it, it is possible to discern from an external observer the evolutionary beginning of the choice and therefore of the behavior, value and purpose or semiosis, where a sign acquires a meaning a posteriori and in a given context of observation [cf. Kull 2009; Ruiz-Mirazo *et al.* 2017].

The meaning has therefore appeared in the universe with life itself because, according to Kauffman, natural selection has assembled the propagating organization of structures and processes that have led to swim along the glucose gradient for valid selective reasons, glucose has a value for the bacterium. And since obtaining food is the function of this organized behavior, assembled by natural selection acting on the most suitable variants, obtaining food is the purpose of the activity and is the doing or the action of the bacterium [cf. Vattay *et al.* 2015].

In almost agreement with this perspective Freeman showed, among others, how human beings have evolved from simpler creatures and certain behaviors of these older forms are precursors of our intentional behavior which is rich and varied. According to Freeman, the evolution

---

<sup>2</sup> In biology, for example, the “heart pumping blood” function is distinguished from other non-functional causal consequences such as “heart noises” by the fact that the organization of processes and structures we call heart was born by virtue of natural selection for its ability to pump blood. Therefore, the heart is ontologically emerging because the very existence of its specific organization of structures and processes in the universe has been constructed by heritable variation and natural selection, which cannot be reduced to physics, where neither signs, nor interpretations, nor errors are logically possible because only events occur.

has given us the ability to grasp intentionality in others without the need to define it. If we see a targeted behavior, we recognize it almost instantly. In zoological literature there are many examples of intelligent behaviour manifested by other vertebrates and also by invertebrates such as octopus, bee and lobster. Darwin, for example, discovered clear evidence of intentional behaviour in earthworms [cf. Freeman 2000].

Of course we can only assume all this by observing the autonomous agent in action. Unity, wholeness and purpose, therefore, constitute, at Freeman's eyes, the basic conditions for the existence of a biological subject carrying meaning. Meanings, therefore, are transmitted through intentionality, that is, through that process by which living organisms change themselves by acting and learning from the consequences of their actions: when an autonomous agent grasps a meaning, in fact, it is pushed towards new behaviours [cf. Di Bernardo 2014].

Well, depending on the complexity of the autonomous agents, there will be different capacities of meaning processing, that is, different channels of communication [cf. Dougherty & Bittner 2010; Emmeche & Kull 2010]. This being so, therefore, according to the perspective outlined before, it is clear that autonomous agents constitute that mysterious place in physics where physics opens up to semantics; however, in my opinion, it is necessary to distinguish in the scale of living beings the actions of simple autonomous agents, such as amoebas and bacteria or more complex ones such as tigers and chimpanzees, from those of *Homo Sapiens*, that is, the only known species so far capable of good and evil.

#### 4. *The preconditions of ethics*

With the *Homo Sapiens*, the most profoundly teleonomic nervous system that has ever existed in the history of our biosphere makes its appearance on earth: only at this level, then, the nature becoming aware of itself actually able to transform actions, that carry meaning, into freely desired acts. In order to fully understand the scope of these considerations it seems appropriate to invoke again the help of Kant who, in *The Metaphysics of Morals*, distinguishes with great insight the term "action" (*Handlung*) from that of "act" (*That*). The action (*Handlung*)

constitutes a change brought about by the subject, that is, by any living being; the act (*that*), instead, is the material content of the action, that is, that of which the subject is the creator [Kant 1797/2006, 47].

According to Kant, therefore, only man performs acts because only man, as the only self-aware being, is able to responsibly recognize an action as an expression of his own subjectivity. At this point, then, we can return to Kantian definition of life. By virtue of the distinction now outlined, it is clear that, at the eyes of the great German philosopher, the faculty to act (*handeln*) in conformity with one's own representations is not only human, but extends to all living systems, that is, to all those cognitive systems which, acting to one's own advantage, are able to reproduce themselves. Well, this brilliant intuition of Kant allows us to reflect also on another relevant question raised by Kauffman. We are referring to the original idea that rudiments of semantics, intentionality, value and ethics are born with autonomous agents and therefore are intrinsically correlated to the notion of life. Such suggestions also allow us to revisit, in the ethical field, Hume's classic criticism that it is not possible to deduce "having to be" from "being" [cf. Hume 1739/2008]. Criticism that laid the foundations of modern ethics, from Kant to utilitarianism, to the present day. Was the English philosopher right? If, according to Kauffman, neither biology nor agency are reducible to physics and if it is true that with minimal molecular agents such as bacteria and amoebas the value enters the universe, then with them the meaning and "having to be" enter the universe. According to the American biochemist, this "having to be" fruit of the agency is not reducible to the language of naked facts, to what "is" of the physical world: the "having to be" is also emerging and not reducible to statements limited to "being" (a teleonomic language is needed to describe it). Although Hume was right in arguing that we cannot deduce "having to be" from "being", at the same time he was also wrong because today we know that values, meaning, actions and "having to be" are real parts of the inventory of the universe: "having to be", in fact, is central to much of man's action and moral reasoning.

Therefore, this approach allows us to dig further into the agent theory as divided by Kauffman. According to the perspective now brought to light, in fact, autonomous agents are surely constructing actors who

always create new meanings, through the realization of unpredictable actions (know-how), but as Freeman denotes all this is possible only because life is essentially assimilation and intentionality [cf. Freeman 2008]: the bios, therefore, at the end of this review, appears as the result of a trans-finished series of adjustments that constitute and unpredictably modify parts of the game itself. So, from these considerations, in my opinion, it is possible to infer that life is not only syntactic language (or a pure system of fixed programs on the edge) and cognition (and, in general, learning), but also appears as a co-evolutive phenomenon in which information is continuously transformed giving birth to a dialectical process of creation and assimilation of new meanings, too: therefore, in agreement with Kauffman and Freeman, the construction of a new semantics becomes more and more urgent, a kind of semantics that is not only of an interpretative type but of a generative type [cf. Di Bernardo 2015].

##### *5. Development of the moral sense and emergence of symbolic thought*

According to this new interpretation which can also be found in other works [cf. Sanyal *et al.* 2012], life in general presents itself as an amalgam of the cooperative and simultaneous work carried out by molecules that can be considered as actual components of a dance; we are referring here to the highly orchestrated game in which DNA, RNA and proteins come to play at the same time the roles of actors and interpreters of a mysterious plot [cf. Gerstein *et al.* 2012].

In fact, today we know that the membrane as a result of the calculations made at the level of the cell develops combinations of proteins able to modulate the expression of DNA at the surface level. In this way, it allows the emergence of potentialities never known before, giving the DNA the opportunity to outline new forms of expression at a functional level [cf. O’Nuallain 2008].

From this complex interweaving a new unity of function and meaning emerges. In fact, there is no longer only a machine of inheritance on the one hand and on the other hand an external meaning enclosed, for example, in a simple selective procedure that is given at the environmental level [cf. Jablonka & Lamb 2014].

Now the eyes of the scientist find themselves in front of a complex interweaving within which the meaning comes to operate as an immanent guide for what concerns the primary expression of life while the observer himself comes to be determined by the function in action [cf. Carsetti 2019]. Today we know that the high number of proteins produced in human cells, and the increased complexity that characterizes our systems, depend on the junk DNA that in the new systemic vision becomes fundamental [cf. Li *et al.* 2011].

Recently, in fact, the completion of the genomic sequences of other organisms (dog, chimpanzee, mouse) has allowed to compare them with the human one (comparative genomics) and it has been discovered that intron sequences contain important information for the functioning of our about 22000 genes. In fact, it is not so much the number of genes as the way in which their functioning is regulated to make man man, dog dog and chimpanzee chimpanzee. However, it should be pointed out that for the systemic vision, we are delineating here, is considered a form of reductionism or materialistic monism, even if of a refined kind, the idea that function is a linear process that emerges from the quantitative complexity of interactions between the many components of the system. This is the position, for example, of Crick, and in part also that of Kandel, who, not distinguishing between surface information and depth information, actually reduce the formal causation due to efficient cause, thus inverting the effect (biomolecular syntax) with the cause (biological meaning) [cf. Crick 1958; Kandel 1976]. Moreover, for them the concept of information cannot be separated from that of material support also reducing “quality” to “quantity” and the temporality that brings new functions [cf. Prigogine 1996/2014] to mere linear spatiality [cf. Boniolo 2003].

However, it should be specified here that the concept of biological meaning adopted by Atlan, Carsetti and Freeman implies the notion of intentional causation, where the notion of “intentionality” [cf. Freeman 1999] refers not only to consciousness, but to agency – the ability of every living system to act (by changing itself and the environment around it) for achieving a precise goal: self-preservation. The concept of meaning here is understood as *forma formans*, i.e. as a process of “production of forms” and is applied in several disciplinary fields. As

the meaning of words is connected with a universe of highly dynamic functions and functional processes that operate synthesis, cancellations, integrations (a universe that we can only describe in terms of symbolic dynamics), in the same way, at the level of systems biology, assimilated *schemata* are continuously revealed and constructed and made available for selection, through the coordinated information that penetrates from external reality (at the mathematical level the non-standard models that interpret these processes despite the different disciplinary fields are practically the same) [cf. Longo & Montévil 2014].

Finally, all this intertwines with the mechanisms of internal selection along a “journey” in the regions of intentionality. In other words and in the more general sense, meaning is a relational property of reality by virtue of which an inanimate object changes its state and a living being feels at its level of sensitivity that the message received provides information that is important for its main purposes such as, for example, that of survival. In short, the meaning of a message is the information (in the sense of modification of properties and behaviour) that the message itself produces in the receiver. Therefore, it can be said that meaning becomes an essential aspect of the omnipresent activity in the universe, “emerges” when life appears [cf. Del Re 2006]. In fact, in the living the ability to attribute meaning to messages that come from outside is a condition for preserving identity. It is indeed a sufficient condition, if necessary physical conditions such as the availability of energy in the right form are met. Seen in this perspective, meaning had to emerge progressively in the history of life [cf. Del Re 1992].

For the primordial bacteria many events must have been indifferent and just few answers were enough to be themselves, i.e. to play their part in their environment. When man appeared, the complexification of the universe produced a being capable of constantly questioning the sense of things and events. Trying to understand the world around him, himself, and his own intuition of something that goes beyond the sensitive is a characteristic of the individual of the species *Homo Sapiens*. At this level, complicated messages are transferred with conventional signs such as those used to represent words. When the signs used are single objects or signs that put a person with realities not directly accessible to the five senses they are symbols.



In the world of men, symbols are everywhere, from the equations of physics to the pillars of cathedrals. Since human beings have appeared in the universe, therefore, the fundamental distinction between sense and meaning has taken on value. According to Frege, the “sense” (*Sinn*) of a word is its function in a context, while the “meaning” (*Bedeutung*) is what it “designates”. But there is more and we can see it considering the use of the word “sense” in a question that highlights its intensional aspect. The question is: is it the same to talk about the meaning of life instead of the sense of life? It is clear that we are alluding to what a man’s life represents in the context of his existential and spiritual life, and not to the definition of life, so the word “sense” seems more correct. On the other hand, when the context is man’s relationship with things (extensional or reference level) the concepts of sense and meaning belong to the same perspective. However, one thing is sure: from human biological information emerge unthinkable qualities for other living beings known until now. Man performs “conscious” acts that imply an incalculable degree of complexity: here the biological meaning that at the microscopic level forms the deep processes of self-organization, at the mesoscopic level regulates the sophisticated and stratified information flows that modulate the interaction between endless populations of neurons, thus laying the foundations for the emergence of the self-consciousness [cf. Freeman 2008].

However, it must be stressed that at the level of biological life, thought is not only the result of simple abstraction. On the contrary, it appears to be linked to a precise linguistic mediation, to the interval of well-defined schematism operating on a symbolic level according to a dialectic that involves a multiplicity of factors inextricably linked to each other. To think is not to guess or even simply to order. On the contrary, it is to concretely realize the conditions for an *embodiment*, that is an incarnation on a primarily biological and neural level. An *embodiment* that binds together, for example, thinking about the movement of a body in space and seeing the contours of a neurogeometry at the level of the visual cortex [cf. Petitot 2013]. The mind therefore presents itself as a real articulated distributed and stratified process of spontaneous self-organization, which has as reference the neural connections. To the extent that they are characterized by processes of self-organization, the



cognitive processes are based, therefore, on the gradual construction of an “I-subject” characterized by a progressive work of abstraction, unification and emergence that leads, on the one hand, to the partial creation and interpretation of external reality and, on the other, to the constitution of that same subject as a cognitive subject.<sup>3</sup>

Since the dawn of civilization the ability of the human being to give meaning to things has been one of the peculiarities that has distinguished our species as being able to produce symbols. Without unity the cognitive process would be impossible because the assimilation of information from the outside implies a unifying subject: transforming the flow of information into something endowed with meaning, in fact, requires the existence of a system of determinations and constraints at the neural level that determine its meaning. The living person is therefore an autopoietic system which organizes itself and at the same time “in-forms” the world: by giving meaning to the world itself, it endows itself with meaning. This explains how it is possible in evolutionary and genealogical terms the passage from consciousness to self-consciousness: it is the cognitive process that, emerging as a process of self-organization, allows the construction of an “I-subject”. In order to explain, therefore, the development of protomnemonic activity (the basis of autobiographical memory) the presence of this subject which is self-knowledge in the moment in which it self-constitutes itself is necessary [cf. Cusinato 2018].

According to this vision, the holistic perspective becomes decisive: in the interpretation of consciousness as a dynamic operator capable of creating order, in fact, suddenly appears a purpose (an ordered totality) incompatible with any vitalistic theory but, at the same time, regulated by a mysterious coupled game of constraints (invariance) and possibilities (the becoming of multiplicity). Therefore, the idea of hierarchical organization demands in itself a finality in so far as it is not possible to separate the structure from its meaning. In the dynamic system precisely

---

<sup>3</sup> Although in a minimal form some more complex animals manifest glimmers of consciousness proportional to their brain structure, only in the human being does consciousness take the form of awareness, i.e. it presents itself as self-consciousness + moral consciousness (conscience) despite the fact that the preconditions of morality already appear with life itself and then develop through genealogy.

within such a multi-level approach, it is possible to trace the preconscious unity of the self, that is, the responsible agent who continuously tries to catch up with the consciously performed actions. According to Freeman, for example, intentionality (deep informational level or semantic aspect of *bios*) is intrinsic to the dynamics of the process of self-organization of every living system and guarantees its unity, gratuitousness and original dimension, as well as independence from matter [cf. Freeman 2000].

From this point of view the very recent results related to this new frontier closely connected with the emergence of a real conceptual revolution at the level of the analysis of that particular *entanglement* of information, biological self-organization, causality and teleonomy show the need to develop a new, non-reductionist naturalistic approach to the problem of the preconditions of ethics able to take into account keeping well distinct the reference planes, not only of the unfolding of the natural forms of human cognition, but also of the genesis of the intentional structures (not referred to consciousness) in autonomous non-human agents, understood as building actors capable of creating always new meanings through the realization of unpredictable actions (know-how) [cf. Kauffman 2016]. We are referring here, in agreement with Kauffman, to the idea that rudiments of semantics, intentionality and value arise with biological systems and are therefore intrinsically related to the same notion of life [cf. Kauffman, 2019]. In fact, the mind, as emergence, intends to grasp in genealogical terms the paths and modalities that determine the selective and coupled action expressed by the meaning, the modalities, in particular, related to the disclosure of the above mentioned semantic apparatus at surface level. It is not a question of discovering new “territories” [cf. Putnam 1975] but to become matrix and arc for their autonomous emergence according to increasing levels of complexity. There is not a random autonomous process already in place (“thing- in-itself”) and an activity of selection and synthesis by means of possible “cutting out”, through, in particular, the use of reference procedures understood as a mode of simple regimentation [cf. Carsetti 2014]. In fact, in agreement with Carsetti, such procedures are functional to the construction of new incompressibility: meaning, as *forma formans*, gives the possibility to realize a holistic anchorage; it is, exactly, what allows the categorial to emerge as “arborization”.

Hence, the opportunity within the theory of complexity to redefine a conception of nature as an evolutionary process of growth of information that allows us to lay the foundations of a meta-biology [cf. Di Bernardo 2019] capable of rethinking the boundaries and the relationship between “being” and “having to be” within a new vision of time no longer understood as repetition and rediscovery, but as the generation and creativity of new structures and new symbolic *schemata* (or systems).

According to this systemic genealogical approach capable of going beyond the mere differentiation of specialist knowledge and, at the same time, of keeping together the procedures and principles, the specificity of the disciplines and the complex language of each area of study must be included in a work of analysis and translation that can finally lead to a synthesis based on the continuous dialogue between different and complementary souls’ knowledge. An example of this is the concept of “integration” which, placed alongside that of plasticity, manages to give account of a broad identity to the notion of intentionality, even if it not all carried out under the sign of conscious rationality. In fact, the idea of integration, proper to an adequate epistemology of complexity, makes it possible to contrast the chaotic image of the centerless mind, proposed by some neuroscientific theories, with the emergence of a unity in diversity compatible with the philosophical position that it is possible to naturalize consciousness and, at the same time, recognize it as a subjective pole as the cornerstone of our conceptions of the world, i.e. the expression of a unitary and continuous subject over time. In this systemic vision, therefore, the notion of plasticity confers uniqueness and irreducibility to the subject who thinks in a continuous circularity between what is invariant (genetic level) and what is constantly becoming (epigenetic level). From this point of view, it is possible to read Kauffman’s proposal to elaborate a precise notion of agency (theory of action) associated with a specific molecular semantics proper to each living being on which it is possible to build an emerging theory of value (beyond the subject-object dichotomy) based on a non-reductionist naturalistic approach. On this line of research, as I have shown recalling the works of Del Re and Freeman, the analysis and development of a specific evolutionary conception of meaning (historical reality “in

itself” and “for me”) as “intentionality not referred to consciousness” and “selective response” that allows to explain in genealogical terms the emergence of ethics and moral sense in human beings has recently come to fruition. Therefore, the development of moral sense would reside in the same evolutionary process of unfolding conditions (molecular semantics) that allow life to emerge as an agency and as a functional closure [cf. Montévil & Mossio 2015] of integrated and self-organizing tasks (Kantian whole). Such conditions when are mediated by symbolic language and thought, i.e. the emergence of a narrative identity as a meeting point between the descriptive and the prescriptive, between what can and must be done, between action and ethics are then translated into ethical attitudes at the human level: the story is exactly what weaves and brings together the fragments of life, emotion and experience that we accumulate as conscious intentional agents in search of the ultimate sense of existence.

## References

- Atlan, H., Louzoun, Y. [2007], Emergence of intentional procedures in self-organizing neural networks, in: *La nuova critica* 49/50, 67-81.
- Boniolo, G. [2003], Biology without information, in: *History and Philosophy of the Life Sciences* 25 (2), 255-273.
- Carsetti, A. [2012], The emergence of meaning at the co-evolutionary level, in: *International Journal of Applied Mathematics and Computation* 219 (1), 14-23.
- Carsetti, A. [2014], Life, cognition and metabiology, in: *Cognitive Processing* 15 (4), 423-434.
- Carsetti, A. [2019], *Metabiology. Non-standard Models, General Semantics and Natural Evolution*, Berlin, Springer.
- Crick, F. [1958], On protein synthesis, in: *Symposia of the Society for Experimental Biology* 12, 138-163.
- Cusinato, G. [2018], *Biosemiotica e psicopatologia dell'ordo amoris. In dialogo con Max Scheler*, Milano, FrancoAngeli.

- Del Re, G. [1992], Meaning as an ingredient of physical reality, in: *La Nuova Critica* 19-20, 41-50.
- Del Re, G. [2006], *La danza del cosmo. Complessità e armonia dell'universo*, Torino, UTET.
- Di Bernardo, M. [2014], *Neuroplasticity, Memory and Sense of Self. An Epistemological Approach*, Aurora, The Davies Group.
- Di Bernardo, M. [2015], Complexity and the emergence of meaning in natural sciences and philosophy, in: *Theology and Science* 13 (2), 245-259.
- Di Bernardo, M. [2016], Systemic approach and meaningful complexity in biology, in: G. Minati, M.R. Abram, E. Pessa (eds.), *Towards a post-Bertalanffy systemics*, Berlin, Springer.
- Di Bernardo, M. [2019], Plasticità dello sviluppo e codici epigenetici. Verso un approccio metabiologico, in: *Giornale di Metafisica* 1, 245-258.
- Dougherty, E.R., Bittner, M.L.[2010], Causality, randomness, intelligibility, and the epistemology of the cell, in: *Current Genomics* 11 (4), 221-237.
- Emmeche, C., Kull, K. (eds.) [2010], *Towards a Semiotic Biology – Life is the Action of Signs*, Singapore, World Scientific.
- Filisetti, A., Graudenzi, A., Serra, R., Villani, M., Fuchslin, R.M., Packard, N., Kauffman, S.A., Poli, I. [2012], A stochastic model of autocatalytic reaction networks, in: *Theory in Biosciences* 131 (2), 85-93.
- Freeman, W.J. [1999], Consciousness, intentionality and causality, in: *Journal of Consciousness Studies* 6 (11-12), 143-172.
- Freeman, W.J. [2000], *How brains make up their minds*, Phoenix, Columbia University Press.
- Freeman, W.J. [2008], A pseudo-equilibrium thermodynamic model of information processing in nonlinear brain dynamics, in: *Neural Networks* 21 (2-3), 257-265.
- Gerstein, M.B., Kundaje A., Hariharan M., Landt S.G. et al. [2012], Architecture of the human regulatory network derived from ENCODE data, in: *Nature* 489, 91-100.

- Gillespie, D.T., Seitaridou, E., Gillespie, C.A. [2014], The small-voxel tracking algorithm for simulating chemical reactions among diffusing molecules, in: *Journal of Chemical Physics* 141 (23), 234115.
- Hordijk, W., Steel, M.[2017], Chasing the tail: the emergence of autocatalytic networks, in: *Biosystems* 152, 1-10.
- Hume, D. [2008], *Trattato sulla natura umana*, transl. A. Carlini, E. Lecaldano, E. Mistretta, vol. 1, Bari, Laterza. (Original work published 1739)
- Jablonka, E., Lamb, M.L. [2014], *Evolution in Four Dimensions. Revised edition*, Cambridge (MA), MIT Press.
- Kandel, E. [1976], *Cellular Basis of Behavior: An Introduction to Behavioral Biology*, San Francisco, W.H. Freeman & Co.
- Kant, I. [2006], *Metafisica dei costumi*, transl. G. Landolfi Petrone, Milano, Bompiani. (Original work published 1797)
- Kauffman, S.A. [1993], *The Origins of Order. Self-Organization and Selection in Evolution*, New York, Oxford University Press.
- Kauffman, S.A. [2000], *Investigations*, New York, Oxford University Press.
- Kauffman, S.A. [2003], Molecular autonomous agents, in: *Philosophical Transaction of the Royal Society a Mathematical, Physical and Engineering Sciences* 361 (1807),1089-1099.
- Kauffman, S.A. [2008], *Reinventing the Sacred. A New View of Science, Reason and Religion*, New York, Basic Books.
- Kauffman, S.A. [2014], Evolution beyond entailing law: the roles of embodied information and self-organization, in: R.J. Marks II, MJ Behe, WA Dembski, B Gordon, JC Sanford (eds.), *Biological Information. New Perspectives*, Singapore, World Scientific, 513-532.
- Kauffman, S.A. [2016], *Reclaiming Enchantment: Humanity in a Creative Universe*, New York, Oxford University Press.
- Kauffman, S.A. [2019], *A World beyond Physics*, New York, Oxford University Press.
- Kauffman, S.A., Clayton, P. [2006], On emergence, agency, and organization, in: *Biology and Philosophy* 21, 501-521.

- Kauffman, S.A., Este R., Goebel R., Hobill D., Shmulevich, I. [2008], Propagating organization of process: an enquiry, in: *Biology and Philosophy* 23 (1), 27-45.
- Kull, K.[2009], Biosemiotics: to know, what life knows, in: *Cybernetics and Human Knowing* 16, 81-88.
- Lee, D.H., Severin, K., Yokobayashi, Y., Ghadiri, M.R. [1997], Emergence of simbiosi in peptide self-replication through a hypercyclic network, in: *Nature* 390, 591-594.
- Li, M., Wang, I.X, Li, Y., Bruzel, A., Richards, A.L., Toung, J.M., Cheung, V.G. [2011], Widespread RNA and DNA sequence differences in the human transcriptome, in: *Science* 333 (6038), 53-58. DOI: 10.1126/science.1207018 (Accessed 30.6.2020).
- Longo, G., Montévil, M. [2014], *Perspectives on Organisms. Biological time, Symmetries and Singularities*, Berlin, Springer.
- Longo, G., Montévil, M., Kauffman, S.A. [2012], No entailing laws, but enablement in the evolution of the biosphere, in: T. Soule (ed.), *Gecco 12. Proceedings of the 14th annual conference companion on Genetic and evolutionary computation*, New York, ACM, 1379-1392.
- Montévil, M., Mossio, M. [2015], Biological organisation as closure of constraints, in: *Journal of Theoretical Biology* 372,179-191.
- Nicolis, G., Prigogine, I. [1989], *Exploring Complexity*, New York, W.H. Freeman.
- O’Nuallain, S. [2008], Code and context in gene expression, cognition, and consciousness, in: M. Barbieri (ed.), *The Codes of Life: The Rules of Macroevolution*, vol. 15, New York, Springer, 347-356.
- Peirce, C. S. [1969], *Collected Papers, Volumes I and II: Principles of Philosophy and Elements of Logic*, ed. C. Hartshorne, P. Weiss, Cambridge (MA), Harvard University Press. (Original work published 1932)
- Petitot, J. [2013], Neurogeometry of neural functional architectures, in: *Chaos, Solitons & Fractals* 50, 75-92.
- Prigogine, I. [2014], *La fine delle certezze. Il tempo, il caos e le leggi della natura*, Torino, Bollati Boringhieri. (Original work published 1996)



- Prigogine, I., Stengers, I.[1999], *La nuova alleanza. Metamorfosi della scienza*, Torino, Einaudi. (Original work published 1979)
- Putnam, H. [1975], The meaning of meaning, in: K. Gunderson (ed.), *Language, Mind, and Knowledge*, Minneapolis, 131-193.
- Ruiz-Mirazo, K., Briones, C., de la Escosura, A. [2017], Chemical roots of biological evolution: the origins of life as a process of development of autonomous functional systems, in: *Open Biology* 7 (4), 170050.
- Sanyal, A., Lajoie B.R., Gaurav J., Dekker J. [2012], The long-range interaction landscape of gene promoters, in: *Nature*, 489, 109-113.
- Vattay, G., Salahub D., Csabai I., Nassimi A., Kaufmann S.A. [2015], Quantum riticality at the origin of life, in: *Journal of Physics* 626, 012023.
- Wallace, R. [2014], Cognition and biology: perspectives from information theory, in: *Cognitive Processing* 15 (1), 1-12.

## Keywords

Genealogy of Morality; Non-Reductionist Naturalism; Biosemiotics; Intentionality; Autonomous Agents; the Evolution of Meaning; Post-Neo-Darwinism

## Abstract

Keeping S.A. Kauffman's agency theory and W.J. Freeman's neurobiology of meaning as a projection period, the contribution through the use of a specific epistemological approach linked to the theory of biological complexity examines the opportunity of interpreting life and cognition as emerging phenomena such as hierarchical levels of self-organization in continuous co-evolution. At this level the relationship between form, function and value becomes a generative biological information of always new dialectical processes of organizational closure. From this point of view, the hypothesis to investigate is that rudiments of semantics, intentionality and value arise with autonomous agents and therefore are intrinsically related to the notion of life itself.

Mirko Di Bernardo  
University of Rome "Tor Vergata"  
E-mail: mirko.di.bernardo@uniroma2.it



PART III  
UEXKÜLL'S CONCEPTS OF  
ORGANISM AND *UMWELT*

GUIDO CUSINATO

BODY ENACTIVISM AND  
PRIMORDIAL AFFECTIVITY.  
MAX SCHELER AND JACOB VON  
UEXKÜLL'S APORIA

TABLE OF CONTENTS: 1. *Introduction*; 2. *The concepts of "environment" and body in Scheler*; 3. *Leib and Umwelt*; 4. *Body schema*; 5. *Uexküll's and Scheler's biosemiotics: Bauplan and Leibschemata*; 6. *Primordial affectivity and expressive dimension*; 7. *The relevance of Scheler's theses for the current debate on enactivism*

### 1. *Introduction*

In this paper, I show that the philosophical discovery of Uexküll's biological reflections must be traced back not to Heidegger's 1929 course, but to a series of Scheler's writings dating back to the years 1909-1916. I argue that Scheler relied on Uexküll's biological notions to rethink Kant's transcendental aesthetics and thus to develop a new ecological approach to the philosophy of perception. However, Scheler's reception of Uexküll's works was not straightforward. At first, Scheler read Uexküll against Kant and interpreted the theory of *Bauplan* in the sense of a merely selective activity (1909-1916). Subsequently, he used the notion of *Bauplan* to develop his own concept of body schema (*Leibschemata*) as the center of perception. At this point, Scheler was forced to tackle the fundamental aporia at the core of Uexküll's system: How do different living species communicate with each other if they belong to different environments (*Umwelten*)?

In order to find a way out of Uexküll's aporia, Scheler posited the existence of a «primordial affectivity» (*Gefühlsdrang*). According to this thesis, every living organism is endowed with a «grammar of elementary expression», which lets it interact on a biosemiotic level with its surrounding environment and with the expressivity of other living

forms. The notion of an organism capable of “feeling” and endowed with a primordial grammar of expression radically transforms the traditional image of life and organisms. In fact, this is an organism that can actively orient itself in its environment. Thanks to these notions, Scheler could establish an enactive perspective of the organism without falling into Uexküll’s aporias of Kantian subjectivism, which instead recur even in several forms of contemporary enactivism.

In Scheler’s perspective, the environment (*Umwelt*) is not a neutral container of the organism, and perception becomes the embodied activity of an organism in interaction with its environment. This thesis anticipates nothing less than the idea at the core of enactive theory today. Largely developed by Scheler in *Formalismus* (1913-1916), during the second half of the 20th century this perspective was dismissed also due to its opposition to cognitivism, only to re-emerge in the contemporary debate thanks to the enactive perspective [Varela *et al.* 1991]. Nonetheless, while the convergences between enactivism and Uexküll’s theory have already been explored, leading for instance to the development of a *biosemiotic enactivism* [De Jesus 2016], the common ground between enactivism and Scheler’s thought has remained completely unnoticed.

The aim of this paper is not to draw attention to these convergences, but rather to Scheler’s position, which sheds light on important aspects hitherto little examined in current enactive theory. In particular, four aspects of Scheler’s perception theory can acquire a central significance in today’s enactive perspective: 1) perception does not attempt to represent the world to the intellect but aims at the survival of the organism, which, by means of its drive structure (*Triebstruktur*), perceives only what is within the horizon of its vital relevance, which defines the boundaries of an organism’s *Umwelt*; 2) perception has an axiological character or, more precisely, the mapping of the *Umwelt* takes place thanks to a valueception (*Wertnehmung*) that precedes and founds perception (*Wahrnehmung*) on a pre-representative level; 3) perception is rooted in the affective sphere; 4) in addition to the basic enactive logic regarding the correlation between *Leib* and *Umwelt* analyzed by Varela, it is also necessary to envisage an enactive logic that concerns the correlation between *person* and *world*.

## 2. The concepts of “environment” and body in Scheler

Understanding the problem of organisms entails redefining notions that in many cases are initially conceived either as “categories”, in the sense of the predicates of being, or in reference to inorganic matter. There is nothing new about the thesis that organisms and life require their own conceptual tools in order to be understood – concepts that are frequently inconsistent with the attempt of classical science to focus on what is general, repeatable, and reversible while excluding what is singular, unforeseeable, and irreversible. This idea was already present in Bergson and exerted a considerable influence upon Scheler.

It is little known that Scheler, between 1909 and 1928, developed a phenomenology of corporeality independently of Husserl, mainly drawing on Uexküll and Bergson. In particular, in the notes for the biology lectures given in the academic year 1908/09 («*Biologie Vorlesung*»), Scheler uses several terms to indicate the concept of environment. He often uses the Gallicism “*Milieu*” [Scheler *GW XIV*, 270-271]. However, there is also a passage in which he uses the German term *Umwelt* in a very peculiar sense:

the environment [*Milieu*] of an amoeba or of a mole differs from that of a horse. [...] There is [therefore] no point in saying that a living being with a more complex organization is better adapted [*angepaßt*] to the environment [*Umwelt*], since it has a completely different environment [*Umwelt*] [Scheler *GW XIV*, 274].

This passage leaves no doubt that, already in 1909, Scheler took up one of the main theses set out by Uexküll in his work *Umwelt und Innenwelt der Tiere* [Cusinato 2018, 70-72]. After 1909, Scheler largely dealt with Uexküll in the 1914 review of his work *Bausteine. Zu einer biologischen Weltanschauung*, whereby Uexküll was brought to the attention of the philosophical debate in Germany [Scheler *GW XIV*, 395-397]. Indeed, Scheler already discussed Uexküll’s positions extensively in the manuscript *Die Lehre von den drei Tatsachen* (1911-12). This shows that Scheler discovered and understood the outstanding philosophical importance of Uexküll’s biological reflections already between 1909 and

1912, and therefore much earlier than Heidegger did in the late twenties.<sup>1</sup> In particular, Uexküll disputed two theses shared by Lamarckian and Darwinian evolutionism, which were dominant at the time. According to the first, there is only one *milieu* that anthropocentrically corresponds to the world of the human being which can be used for measuring the degree of adaptation of the different living species. Against it, Uexküll maintained that there are as many environments as there are living species, and it makes no sense to establish hierarchies of adaptation because each species is perfectly adapted to its own specific environment. The second thesis maintained by popular Darwinism held that all organisms passively adapt to this unique *milieu*. Uexküll, instead, asserted that each organic species interacts with its own specific *Umwelt*.

Scheler took up both of Uexküll's assertions by rethinking them through Nietzsche's philosophy. In his essay *Ressentiment* (1912), Scheler refers to Nietzsche's criticism of civilization as the expression of a degenerate form of adaptation, which is typical of a biologically deficient being such as the human being. In Scheler's view, civilization is an "unfair" form of adaptation that is achieved not through organ formation (*Organbildung*), as is the case of other animals, but by means of the artificial construction of instruments (*Werkzeuge*).

The mechanistic conception of nature, for Scheler, reflects this resentful mentality, which would have led the human being to exalt the instrument (*Werkzeug*) and to understand and explain the organism as a set of mechanical parts [Cusinato 2008, 142-143]. Moreover, Scheler also maintains that there is more than one arena of struggle for existence designed after the human model [Scheler *GW* X, 312] and that each animal species thus has its tailor-made environment.

We can also find complete convergence between Scheler and Uexküll concerning the second assertion. By criticizing the idea of a purely passive adaptation, Scheler says that the variety and morphological richness of life proves that the very «formation of the organ is not an adaptation [*Anpassung*] to a natural environment [*Umgebung*] given as

---

<sup>1</sup> Heidegger's analyses of Uexküll (in particular during the Winter Semester of 1929-30) lack the depth that characterizes Scheler's reflections on the same theme in *Formalismus* (1913-1916). On Scheler and Uexküll, see Cusinato [2008, 179-182]; Brentari [2015]; Guccinelli [2016]; Cusinato [2018, 70-79].

dead, since the same process in which the organ is formed also determines the essence and structure of the milieu or nature» [Scheler *GW* III, 143].

Scheler tackles in greater depth Uexküll's theses, which he reinterprets through Bergson's thought, in the manuscript *Lehre von den drei Tatsachen* (1911-1912). Here Scheler describes the symbolic relationship between *Umwelt* and *Leib* in terms of selection in accordance with the thesis of the lived body (*Leib*) as analyzer (*Analysator*) [Scheler *GW* X, 437-440, 478]. On this basis, Scheler establishes an ecological theory of perception in which stimuli are defined as aspects of the world (*Welt*) around (*um*) the organism whose variations lead to changes in its vital processes.

It is interesting to observe that Uexküll's influence is also visible in *Ordo amoris* (1914-1916), albeit from an unexpected ethical perspective. The expression «*moralische Umwelt*» indicates the dynamic «moral environment» as opposed to the rigid and immutable environment of destiny (*Schicksal*) [Scheler *GW* X, 348; 352-353, 374]. In this way, Scheler transfers Uexküll's ecological thesis to the ethical sphere. *Ethics is no longer conceived under the banner of a passive adaptation to what ought to be* (Seinsollen), *but as the result of a dynamic correlation between one's ordo amoris and the ethos of the society in which one lives.*

### 3. Leib and Umwelt

In explicit reference to the theory of *Umwelt*, as early as 1909 Scheler distinguished between *Lebewesen* and *Körper*, which would be the starting point for the further distinction between *Leib* and *Körper*: The *Lebewesen* has an *Umwelt* while the *Körper* does not. A «living being is not a body [*Körper*]» [Scheler *GW* XIV, 314] since what corresponds to it is not the spatiotemporal world of the inorganic but an environment [Scheler *GW* XIV, 271] that has its own categories of time, space, and movement irreducible to those of a physical object [Scheler *GW* XIV, 335]. Also in 1909, Scheler argued that these categories can be conceived only in relation to the lived body so that one can maintain that «presence, past, and future do not have any significance independent of the vital world» [Scheler *GW* XIV, 335]. For Scheler, this means that a

*Lebensphänomen*, as opposed to a *Körper*, turns out to be irreducible to the Cartesian dualism of *res cogitans* and *res extensa* and consequently, from the point of view of its content, is a «psycho-physically indifferent phenomenon» [Scheler *GW* XIV, 325]. All of these attributes, including the psycho-physic indifference, which would become crucial both in Plessner's and Merleau-Ponty's phenomenology of corporeality, are thereafter ascribed to the *Leib* [Scheler *GW* II, 388].<sup>2</sup>

What still appeared as a sketched phenomenology of corporeality in the semester 1908/1909 took on a more distinct aspect in the following years, especially through the manuscript *Die Lehre von den drei Tatsachen* (1911-12) and the essay *Über Selbsttäuschungen* (1912). In the first text, the *Leib* has the function of an analyzer (*Analysator*) of the stimuli coming from the *Umwelt* [Scheler *GW* X, 437]. Here, Bergson's influence is evident: according to him, perception «consists in detaching from the whole set of the objects my body's possible action on them. Perception is nothing but a selection. It creates nothing» [Bergson, 1959, 360]. Scheler further develops this perspective in his 1912 essay *Über Selbsttäuschungen*, where he states that the *Leib* is «a notion that should be clearly distinguished from that of *Körper*» [Scheler 1912, 105] since it is the premise for inner sense and outer sense.

It is in this passage that, for the first time, *Leib* and *Körper* are distinguished in a published text in the field of phenomenology.<sup>3</sup> Inner sense and outer sense are selection organs, and each of them functions as an «analyzer of perception» (*Analysator des Wahrnehmens*) [Scheler 1912, 108]. Perceiving, therefore, means selecting through inner and outer sense what proves relevant to the *Leib*. What is perceived in the first instance, on the pre-representative level, are the value units (*Werteinheiten*) and their qualities [Scheler 1912, 142]. According to Scheler, the *Leib* becomes the «material a priori» of perception. Perception, thus, is

---

<sup>2</sup> Later, in *Formalismus*, Scheler returns to the crucial importance of this point: «The lived body, or rather its immediate perception as totality, founds both the givenness of the psyche of the lived body and that of the physicality of the lived body. And it is precisely this original phenomenon, the phenomenon of a double foundation, that constitutes the lived body in the strictest sense of the term» [Scheler *GW* II, 399].

<sup>3</sup> On the origin of the distinction between *Leib* and *Körper* in Scheler and Husserl, cf. Cusinato [2018, 81-86].

no longer considered in reference to the categories of the intellect, as was the case in Kant, but to a relevance order determined by the *Leib*. Such a relevance order results from the Uexküllian perspective. Only what has the «meaning of a signal from the environment [*Umwelt*] for our practical steps» [Scheler 1912, 140-141] can be perceived. The value qualities, therefore, are not “subjective” but rather «understood as signals for certain actions, [they are] separated and translated into notions and words only insofar as they are signals for different actions united by certain ends» [Scheler 1912, 140].

#### 4. *Body schema*

There are two different phases in Scheler’s reflection on the phenomenology of the *Leib*. In the first phase preceding *Erkenntnis und Arbeit*, the *Leib* carries out a pre-representative categorial function: «It functions as a form [...], we can also say, as a category of perception» [Scheler *GW* II, 397]. We are dealing here with a categorial function, though, that is not productive but merely *selective*: The *Leib* «is only an analyzer» of givenness [Scheler *GW* VII, 248] that scours the surrounding environment in order to select relevant elements [Scheler *GW* X, 437]. In this way, Scheler transforms Kant’s “schematism” into the “schematism of the *Leib*”. We can find more detailed analyses in this sense in the second part of *Formalismus* [Scheler *GW* II, 396-420].

In the second phase, from *Erkenntnis und Arbeit* (1926) to *Idealismus-Realismus* (1928), Scheler shifted more decisively towards an “enactive” perspective, which in any case can already be found in *Formalismus*. At this stage, he took up again the question concerning the schematism of the *Leib*, which he viewed as no longer only selective but also “creative”. In doing so, he turned back to a more careful consideration of Kant’s problem posed by Uexküll through the notion of *Bauplan*.

What marks the transition between these two phases is the concept of «body schema» introduced in 1926.<sup>4</sup> In developing this notion, Scheler was influenced by Paul Schilder’s analyses on *Körperschema*

---

<sup>4</sup> Cf. Scheler [*GW* VIII, 316, 355; *GW* IX, 34, 218].



put forth a few years earlier [Scheler *GW IX*, 218].<sup>5</sup> It is worth mentioning, however, that he did not use the term *Körperschema* but *Leibschema*, which is consistent with his distinction between *Leib* and *Körper*. In coining the term *Körperschema* Schilder, in his turn, was influenced by Scheler's reflections on the notion of *Leib* in *Formalismus* [Schilder 1950, 283].<sup>6</sup> Schilder may be referring here to the circumstance that the idea of *Leibschema* is already implied in the theory of body schematism expounded in *Formalismus*, as the use of the expression «*Schema unseres Leibes*» [Scheler *GW II*, 409] eloquently shows.<sup>7</sup>

The notion of body schema profoundly changed Scheler's perspective since it practically took up the problems of Kant's schematism and applied them to the lived body. In the first phase, Scheler only conceived of the lived body as the «material apriori» that orients the selection of perception. After introducing the theory of body schema, however, he traced back to the lived body the enactive faculty to produce an image (*Bild*) as a schema that anticipates a sensorimotor activity or an action. Therefore, the body schema envisages an «embodied phantasy» or imagination referring not to the intellect but to the lived body itself [Cusinato 2008, 137-141; 2018, 227-230].

---

<sup>5</sup> In 1926 Scheler also quoted Schilder's concept of *Körperschema* in the *Preface* to the third edition of *Formalismus* [*GW II*, 24]. Previously, he had mentioned Schilder referring to his studies on hypnosis [see, e.g., *GW VII*, 31-34].

<sup>6</sup> «We are here in better accord with philosophers, especially with Scheler [...]. He uses for this inner body the German word '*Leib*'. In his opinion the '*Leib*' is independent of the sensation of the inner organs; it is different from single sensations and different from any other object. He emphasizes that our body (*Leib*) is always given to us as a unit with some more or less vague structure» [Schilder 1935/1950, 283].

<sup>7</sup> A remarkable development of these themes can be found in Gallagher [1986]. On the notion of «body schema» in Schilder, Scheler, and Gallagher, cf. Cusinato [2018, 88-89].

### 5. Uexküll's and Scheler's biosemiotics: Bauplan and Leibschema

As a matter of fact, Uexküll is a Kantian striving to conceive the body in such a way that it can work with a Kantian *a priori*.<sup>8</sup> According to Uexküll, an organic species “phenomenologically” does not experience a part of reality, since the “real world” remains an inaccessible *Ding an sich*. Instead, it creates its own environment in a Kantian sense, namely as an “internal” environment (*Innenwelt*). The organism of a species relates to an environment that is *produced* and not passively *received*, just as the Kantian subject *synthesizes* the phenomenon out of the chaos of sensory manifold. From this stems the problem at the center of Uexküll's thought: How is it possible that the environments of different living species can come into contact with each other?

At the core of Uexküll's theory is the idea that the organism is endowed with a creative construction plan (*Bauplan*) capable of producing “magical environments” and that, by means of the “intentionality” of these supra-individual natural plans, it produces the signification of its own surrounding environment understood as *Innenwelt*. The creativity and intentionality of the *Bauplan* replace instinct, which remains an ambiguous concept for Uexküll: The organism moves about in its environment oriented not by instinct, but by its own *Bauplan*. This idea has several similarities with Scheler's thesis. According to it, the organism is endowed with its own orientativeness that in the case of an animal organism is embedded in the drive structure (*Triebstruktur*) of the lived body [Cusinato 2008, 68-79].

Uexküll's concept of construction plan has a Kantian “legislative” meaning. For Uexküll, the organism, first of all, does not passively adapt to the environment. Nor does it merely select pieces of real givenness already constituted in themselves, as Scheler maintains. This comes because according to Uexküll rule and plan have nothing to do with *Ding an sich* and rather they are just the form in which we can know the effects of the natural factor in question. In Uexküll the natural factor in itself remains completely unknown.

---

<sup>8</sup> Scheler's notion of *a priori* considerably differs from that of Kant. In the following pages, therefore, I use the term «*a priori*» in reference to Kant and «*apriori*» to Scheler.

In Uexküll's view, the world is conceived as a *Ding an sich* and in the beginning there is only a chaotic set of impressions that in the Kantian sense acquires a phenomenologically verifiable form only thanks to the intervention of the organism's *Bauplan*. The *Bauplan* does not select phenomena from the surrounding world that are already constituted in themselves as Scheler asserts in his *Formalismus*. Instead, it synthesizes images of semiotic markings (*Merkbilder*) in an inner world (*Innenwelt*). Likewise, the organism does not perceive representations of real objects (which for Uexküll remain *Dinge an sich*), but only the signals (*Merkmale*) of the relevance that certain aspects of the environment have for the *Bauplan* of the organism. In this manner, Uexküll eventually paves the way to a semiotic interpretation of Kant [Schönrich 1981] as well as to an interpretation of Peirce's semiotics in terms of a biosemiotics.

At this point, Uexküll faces the problem of the operative closure of the system, which also recurs in Maturana, Varela, and Luhmann. As we have seen, according to Uexküll, the organism does not reflect the reality of the surrounding world, but it re-elaborates the stimuli as signals of the environmental qualities that are relevant to the sensorimotor functioning of the organism. Each living species has its own way of perceiving the world. The tick, for instance, focuses on the olfactory and thermostatic variations caused by the passage of mammals under the branch of the tree from which it is hanging: This corresponds to a specific environment, to an ecological niche that coincides with that very small part of the *Merkmale* (semiotic markings) useful to its vital relevance. In this way, its perceptual world coincides with the biosemiotics of such markings. The set of these relevant *Merkmale* constitutes its *Merkwelt*. The verb *merken* originally means «to provide with a mark (*mit einem Zeichen versehen*)» or «to mark / to make recognizable (*kenntlich machen*)». The term *Merkwelt*, thus, literally means «the world that is provided with a mark» or «the world that is made recognizable» by the organism. In the following pages, I translate the term as «world of semiotic markings» instead of «perceptual world», as it is generally rendered. In my opinion, this common translation weakens the sense of the German term: The *Merkwelt* is not simply the «perceptual world», but a perceptual world in which a «functional circle» (*Funktion-*

*skreis*) between the perception of semiotic markings that is of vital relevance for the organism, on the one hand, and the acting of the organism, on the other, is brought into being. By so doing, the organism does not actually perceive objects, but only the biosemiotics of this «functional circle». Perception and semiotics coincide. The organism only perceives what is functional to its own sensorimotor operativeness and acts in accordance with the biological markings it perceives. Everything a subject perceives becomes its world of semiotic markings (*Merkwelt*) and everything it does constitutes its operative world (*Wirkwelt*). Thus, the world of semiotic markings and the operational world form the closed totality of the «functional circle», namely the environment. Here I will limit myself to observing that in nature the way of acting, the way of perceiving semiotic markings and the biological form are intertwined: The way of acting not only is guided by what the semiotic markings signal, but also by the way in which the sense organs perceive them. For instance, the perceptual horizon of a shark is dominated by its auditory and olfactory organs. Thanks to its highly developed olfactory lobes, it is able to grasp very small olfactory variations between the right and the left nostril (which for this reason, e.g., in the hammerhead shark are set wide apart), so that in order to locate its prey it moves forward sniffing the water with a typical zigzag movement.

From this biosemiotic perspective, the environment is never given once and for all, but rather it is the result of the dynamic interaction between *Wirkwelt* and *Merkwelt*: The action starting from the organism returns retroactively to the organism itself (in the sense of the Schelerian *Rückmeldung*) and the action of the «marking sign» (*Merkzeichen*) finds its end in the action of the «operative sign» (*Wirkzeichen*) towards the environmental variables. Thereby, the «functional circle» determines an operative closure of the system itself with respect to the surrounding environment.

The most important aspect here is that for Uexküll each organic species develops itself by creating its own environment according to a precise *Bauplan*, that is to say, a non-mechanistic and non-instinctual program that restores that character of spontaneity of the body expunged by previous philosophical theories. While for Uexküll the environment referring to a single species is something *constructed* in the

Kantian sense, in the middle period of Scheler's work, which includes his *Formalismus*, it remains phenomenologically *given*, although in a different way for each species.

However, once Scheler pointed out the enactive perspective embedded in his notion of *Leibschema*, it became clear that the solution of "perspectivism" provided in *Formalismus* was no longer sufficient. Scheler realized then that Uexküll's approach to the Kantian mindset expressed in the concept of *Bauplan* brought to the surface the aporia underlying this position, of which Uexküll was never able to find a truly satisfactory way out: How can different species belonging to different *Umwelten* communicate with each other?

### 6. *Primordial affectivity and expressive dimension*

According to an opinion still widely held today, claiming that life is characterized by sensibility, affectivity, and the ability to interact with values and expressions does not mean thinking of life in terms of its own categories but rather projecting anthropocentric categories onto life. This therefore results in something similar to a "naturalistic fallacy". In this view, these categories belong properly and exclusively to the human being, so thinking that they are also valid for nature is nothing but the product of an anthropocentric projection. Surprisingly, the problematic nature of this reasoning is often overlooked: Following this logic, all the most important characteristics of life become the exclusive monopoly of the human being. Isn't this anthropocentrism at its purest?

This way of thinking has applied reductionism to the study of organisms and life, leaving out all those categories and notions that cannot be quantified or be traced back to physical laws, such as purpose, value, subjectivity, expression, feeling, and affectivity. The goal of this view is to not take into account the internal point of view of an organic system, but only its basic constituent elements.

The difference between the processes concerning living matter and those involving inanimate matter has been at the center of biological research from the beginning of modern science. It has also given rise to the controversy known to science historians as the dispute of *vitalism* against *mechanism*. Around the mid-20th century, the arrival of

molecular genetics and the discovery of the genetic code undermined the thesis that, unlike the non-living, living beings had some peculiar “vital force”. Vitalism thus seemed to lose its most important foundation, which allowed its supporters to defend the idea that the living are fundamentally irreducible to the physical laws of matter. The biological processes of genetic transmission, in fact, could now be interpreted in a highly unified manner through the discovery of the genetic code. Finally everything could be understood by referring only to the principles of physics and chemistry.

As usual, though, the devil is in the details. In fact, a series of notions extraneous to physics and chemistry entered into this framework and took part in describing fundamental life processes. These notions, such as *information*, *message*, *transmission*, or *translation*, also have a philosophical meaning. Nevertheless, they were considered – in a certain sense “tolerated” – as mere metaphors, only useful for popularizing phenomena that remained essentially chemical and physical in nature. However, even the keenest supporters of physicalism had to admit that these were “indispensable metaphors”.

The question of *information* was already present in cybernetics, according to which it was possible to interpret not only life but also the genetic code itself following the model of a “computer”. However, this approach has been gradually challenged. In particular, feeling and affectivity have been progressively regarded as irreducible to the “computer” model, at least as it was initially conceived. Moreover, since the Human Genome Project (HGP) was concluded in 2000, it has become increasingly evident that knowing the sequences of the elementary “building blocks” of life is not sufficient to explain life processes [Lewontin 2000]. Instead, it is necessary to also study and analyze the dimension which 20th-century genetics had gradually marginated, namely the dimension of biological individuality or, more precisely, the self-organization and complexity that makes an organism a biological individuality.

We can find a different approach to the question of *information* in biosemiotics. Since the 1960s and 1970s, this discipline has proposed to consider all biological processes as intrinsically semiotic, including those concerning the simplest life units, such as cells, and those relating to animal (and human) groups and societies. The main thesis of biose-

miotics is that “life is semiosis” at every level. As a result, there is a “semiosphere” corresponding to the biosphere, that is to say, a kind of semiotic dimension common to all living beings as such, not only those endowed with language, abstract thinking, or representative capacity. From this point of view, even Gregory Bateson can be considered a forerunner of biosemiotics [Hoffmeyer, 2008].

Scheler, who connected his reflection to Uexküll’s ecological theory very early on, also fully embraced this perspective. The novelty of Scheler’s position consisted in his attempt to reinterpret life through two strategic categories, namely «primordial affectivity» (*Gefühlsdrang*) and «grammar of expression» (*Grammatik des Ausdrucks*). Scheler extended a «primordial affectivity» (*Gefühlsdrang*)<sup>9</sup> to all living organisms, including plants. According to this thesis, every living organism is endowed with an elementary germ of a «grammar of expression» that lets it interact with the surrounding environment and with the expressivity of other living forms [Scheler *GW* VII, 22; 92; 112; VIII, 274; XII, 86; 143].

Certainly, Scheler also drew an essential distinction between plants and animals. In the former, in fact, there is still no feedback (*Rückwendung*) to a center:

Therefore, in the case of plants, I speak of “ecstatic” primordial affectivity [*Gefühlsdrang*] in order to describe this total lack of feedback [*Rückmeldung*] of organ states to a center, which is peculiar to animal life – this total lack of a turning back [*Rückwendung*] of life into itself, even of the most primitive re-flexio, even of the most faintly “conscious” inner state [Scheler *GW* IX, 15].<sup>10</sup>

---

<sup>9</sup> On the notion of «primordial affectivity» (*Gefühlsdrang*) in Scheler’s thought, cf. Scheler *GW* VIII, 337; IX, 13-16. This concept, which is at the core of Scheler’s philosophical anthropology, has been recently used also by Colombetti [2013].

<sup>10</sup> «Daher spreche ich bei der Pflanze von “ekstatischem” Gefühlsdrang, um dieses totale Fehlen einer dem tierischen Leben eigenen *Rückmeldung* von Organzuständen an ein Zentrum, dieses völlige Fehlen einer *Rückwendung* des Lebens in sich selbst, einer noch so primitiven re-flexio, eines noch so schwach “bewußten” Innenzustandes zu bezeichnen» [Scheler *GW* IX, 15].



Thus, only in relation to the animal is it possible to speak of “sensation”. This difference, however, does not call into question a fundamental unity of all life in terms of the two categories of «expression» (*Ausdruck*) and «primordial affectivity». Expression (*Ausdruck*), for Scheler, is the «Urphänomen des Lebens» [Scheler *GW IX*, 15]. From this point of view, «already in plant existence [*im pflanzlichen Dasein*], one finds the *primordial phenomenon* [*Urphänomen*] of expression, a certain physiognomy of their inner states, [in other words,] of the conditions [*Zuständlichkeiten*] of primordial affectivity [understood] as the inner being of their life, such as weak, strong, luxuriant, or poor» [Scheler *GW IX*, 15].<sup>11</sup>

The thesis I argued for in several works is that living beings relate to the expressive dimension by means of primordial affectivity. This implies that the essential characteristic of life is to be found in its interaction with the expressive dimension: All that is capable of interacting with the expressive dimension through primordial affectivity is life. Undoubtedly, non-living matter, such as a burning piece of paper, also can be highly expressive, and a computer can recognize facial expressions. Nevertheless, only life is able to interact with expression through primordial affectivity [Cusinato 2008, 98; 2018, 101-104].

### *7. The relevance of Scheler's theses for the current debate on enactivism*

From the perspective of cognitivism, which was hegemonic until the end of the 20th century, sense-making is considered to be the result of an intellectual cognitive activity separate from the body. With Varela [*et al.* 1991] enactivism overturns this perspective and considers perception as an embodied activity of an organism in interaction with its environment. This is exactly the conclusion reached by Scheler in *Formalismus* under the influence of Uexküll's theory of *Umwelt*.

---

<sup>11</sup> «[...] bereits im pflanzlichen Dasein [findet sich] das *Urphänomen* des Ausdrucks, eine gewisse Physiognomik ihrer Innenzustände, der Zuständlichkeiten des Gefühlsdrangs als des Innenseins ihres Lebens, wie matt, kraftvoll, üppig, arm» [Scheler *GW IX*, 15].



However, it is only from *Erkenntnis und Arbeit* (1926) onward that Scheler's enactive perspective becomes explicit. Scheler gradually takes up the theme, which Uexküll put forth through the concept of *Bauplan*, and connects it to a "legislative" of the "lived body". In *Erkenntnis und Arbeit* Scheler realizes that the solution offered in *Formalismus* risks undermining the results achieved by the phenomenology of corporeality. He is also compelled to deal with the theme at the core of Uexküll's proposal, that of the legislative productivity of the organism. By posing the problem of a material legislation of the lived body, instead of obliterating Uexküll's Kantian problem, Scheler rethinks it from an "enactive" perspective, ascribing to the lived body that very legislative capacity that Kant formerly assigned to the intellect. In Scheler's last writings we can find the intuition of an enactive activity that lies at the basis of perception and has its driving force in the drive-phantasy (*Triebphantasie*), namely a fantasy which is conceived in relation not to the intellect but to the body schema [Cusinato 2018, 87-97; 230-236]. The *Umwelt* for Scheler is not an external container in which the living organisms grow and move. According to his *Erkenntnis und Arbeit*, the organism interacts with the *Umwelt* from its own specific "enactive" point of view, which is represented by the drive-phantasy (*Triebphantasie*). Hence, the *Umwelt* is not a neutral place, but always means something in relation to the organism.

In this respect, there are four aspects of Scheler's theory that are particularly significant for the current debate on enactivism: 1) perception does not attempt to represent the world to the intellect but aims at the survival of the organism, which, by means of its drive-phantasy (*Triebphantasie*), perceives only what is within the horizon of its vital relevance that defines the boundaries of an organism's *Umwelt*; 2) perception has an axiological character or, more precisely, the mapping of the *Umwelt* takes place thanks to a valueception (*Wertnehmung*) that precedes and founds perception (*Wahrnehmung*) on a pre-representative level; 3) perception is rooted in the affective sphere; 4) in the human being perception not only refers to the interaction between *Leib* and *Umwelt*, but also to that between *person* and *world*: thus, we must admit a form of "anthropogenetic enactivism" also for the personal center [Cusinato 2018, 242-244]. Only recently has a debate begun to emerge

over the axiological and affective dimension of an enactivism which distinguishes itself from the enactivism functional to the relationship between organism and environment and whose propulsive core instead lies in the activity of positioning the person in the world.<sup>12</sup>

Each of these themes at the center of Scheler's phenomenology can offer an important contribution to the current enactive perspective. An organism capable of "feeling" and endowed with a primordial grammar of expression radically transforms the traditional image of life and organisms. In this view, an organism perceives values (such as useful or harmful) on the pre-representative level (*Wertnehmung*) and can enactively orient itself in the environment. By developing this Schelerian approach, we can establish an enactive perspective of the organism without falling into Uexküll's aporias of Kantian subjectivism, which instead recur even in several forms of contemporary enactivism.

## References

- Bateson, G. [2000], *Steps to an Ecology of Mind*, Chicago, University of Chicago Press.
- Bergson, H. [1959], *Œuvres, Édition du centenaire*, Paris, PUF.
- Brentari, C. [2015], *Jakob von Uexküll. The Discovery of the Umwelt between Biosemiotics and Theoretical Biology*, Dordrecht/Heidelberg/New York/London, Springer.
- Brentari, C. [2018], Constituting and living the *Umwelt*. Two levels of semiosis in Jakob von Uexküll's environmental theory, in: *Versus. Quaderni di studi semiotici* 127 (2), 303-322.
- Colombetti, G. [2013], *The Feeling Body: Affective Science Meets the Enactive Mind*, Cambridge (MA), The MIT Press.
- Cusinato, G. [2008], *La Totalità incompiuta. Antropologia filosofica e ontologia della persona*, Milano, FrancoAngeli.

---

<sup>12</sup> On this aspect, which for reasons of space cannot be expanded here, please refer to: Cusinato 2017, 209-214; 2018, 242-244. In a more recent time, along these lines de Haan proposed to distinguish between a *basic* and an *existential* sense-making [De Haan 2020, 8-9].

- Cusinato, G. [2013], Introduzione. La fenomenologia e le affordances espressive dei dati di fatto puri, in: Max Scheler, *Scritti fenomenologici*, ed. V. D'Anna, Milano, FrancoAngeli, 7-21.
- Cusinato, G. [2017], *Periagoge. Teoria della singolarità e filosofia come esercizio di trasformazione*, QuiEdit, Verona.
- Cusinato, G. [2018], *Biosemiotica e psicopatologia dell'ordo amoris. In dialogo con Max Scheler*, FrancoAngeli, Milano.
- De Haan, S. [2020], *Enactive Psychiatry*, Cambridge, Cambridge University Press. doi:10.1017/9781108685214
- De Jesus, P. [2016], From enactive phenomenology to biosemiotic enactivism, in: *Adaptive Behavior* 24 (2), 130-146. doi:10.1177/1059712316636437
- Favareau, D. [2009], *Essential Readings in Biosemiotics. Anthology and Commentary*, Dordrecht/Heidelberg/New York/London, Springer.
- Gallagher, S. [1986], Body image and body schema: a conceptual clarification, in: *Journal of Mind and Behavior* 4, 541-554.
- Guccinelli, R. [2016], *Fenomenologia del vivente. Corpi, ambienti, mondi: una prospettiva scheleriana*, Roma, Aracne.
- Gould, S.J. [2002], *The Structure of Evolutionary Theory*, Cambridge (MA)/London, Belknap Press of Harvard University Press.
- Guidetti, L. [2013], Jakob von Uexküll tra Kant e Leibniz. Dalla filosofia trascendentale alla topologia del vivente, in: *Rivista Italiana di Filosofia del Linguaggio* 7 (2), 66-83.
- Hoffmeyer, J. (ed.) [2008], *A Legacy for Living Systems. Gregory Bateson as Precursor to Biosemiotics*, Dordrecht, Springer.
- Kaufman, S. [1995], *At Home in the Universe. The Search for Laws of Self-Organization and Complexity*, New York/Oxford, Oxford University Press.
- Lewontin, R. [2000], *It Ain't Necessary So. The Dream of Human Genome and Other Illusions*, New York, The New York Review of Books.
- Scheler, M. [1954-1997], *Gesammelte Werke [GW]*, XV vol., ed. Maria Scheler (1954-1969), Bern/München, Francke Verlag; ed. Manfred S. Frings (1970-1997), Bonn, Bouvier Verlag.

- Scheler, M. [2018], *Die Stellung des Menschen im Kosmos*, ed. W. Henckmann, Hamburg, Felix Meiner Verlag.
- Schönrich, G. [1981], *Kategorien und transzendente Argumentation. Kant und die Idee einer transzendentalen Semiotik*, Frankfurt a.M., Suhrkamp.
- Uexküll, J. von [1909], *Umwelt und Innenwelt der Tiere*, Berlin, Springer.
- Uexküll, J. von [1913], *Bausteine zu einer biologischen Weltanschauung*, München, Gross.
- Uexküll, J. von [1928], *Theoretische Biologie, 2. gänzlich neu bearbeitete Auflage*, Berlin, Springer.
- Varela, F.J., Rosch, E., Thompson, E. [1991], *The Embodied Mind: Cognitive Science and Human Experience*, Cambridge (MA), The MIT Press.

### Keywords

Scheler; Uexküll; material apriori; body schema; primordial affectivity (*Gefühlsdrang*); biosemiotics; enactivism; valueception; *Umwelt*; *Leib*

### Abstract

This paper is aimed to discuss and reconsider life categories starting from German phenomenologist Max Scheler's analysis of the "lived body" (*Leib*), which he developed between 1909 and 1928 independently of Husserl. For the philosophy of biology, Scheler's phenomenology of corporeality is of outstanding importance, because the categories it applies to the *Leib* are not taken from the inorganic world, as is ultimately still the case with Husserl, but from Jacob von Uexküll's biology and Bergson's philosophy. It therefore represents one of the most significant attempts to rethink life in accordance with the categories proper to life itself.

Scheler's reception of Uexküll's works was not straightforward. At first, Scheler read Uexküll against Kant and interpreted the theory of *Bauplan* in the sense of a merely selective activity (1909-1916). Subsequently, he used the notion of *Bauplan* to develop his own concept of body schema (*Leibschema*) as the enactive center of perception. At this point, Scheler was compelled to tackle the fundamental aporia at the center of Uexküll's system: How do different species communicate with each other if they belong to different environments (*Umwelten*)? In order to find a way out of Uexküll's aporia, Scheler posited a basic unity of life on the unipathic level (*Einsföhlung*).

Scheler's solution was thus the following: Living beings in different environments (*Umwelten*) communicate with each other because every living organism is endowed with an elementary «grammar of expression», which on the level of primordial affectivity enables a pre-representative communication of all living forms, including plants. The most significant aspect of this solution is that Scheler could develop an enactive perspective of the organism without falling into Uexküll's aporias of Kantian subjectivism, which are still found in several forms of contemporary enactivism.

Guido Cusinato  
University of Verona  
E-mail: [guido.cusinato@univr.it](mailto:guido.cusinato@univr.it)

CARLO BRENTARI

KANTIAN MONADS IN A PLATONIC WORLD.  
SOME REMARKS ON  
THE PHILOSOPHICAL BACKGROUND OF  
JAKOB VON UEXKÜLL'S *UMWELTLEHRE*

TABLE OF CONTENTS: 1. *The animal as Kantian subject*; 2. *The Uexküllian subject as a monad*; 3. *How to grant harmony to a multi-world nature: the Platonic way*; 4. *Concluding remarks*.

1. *The animal as Kantian subject*

Chief aim of this paper is to investigate some philosophical assumptions, as well as some consequences, of Jakob von Uexküll's biological *Umweltlehre*. I will focus on Uexküll's philosophical background with particular regard to his intent to grasp and describe the perceptive and operative ways through which animal organisms *shape* and *share* their experienced reality. In other words, I will highlight some philosophical reference points of the yearlong process through which Uexküll develops his most famous contribute to philosophy of biology: the idea of the *Umwelt* as a subjective, species-specific, and (at the same time) intersubjective and inter-specific sphere of perception and action. One of the aspects that most make Uexküll's theoretical biology and behavior theory original is, indeed, the importance he gives to animal subjectivity. Without going into a detailed analysis of the textual references [cf., in this regard, Brentari 2018], I would start my analysis by underlining two key traits of Uexküll's concept of subjectivity. The first is its anti-mechanistic function in biological and zoological research. Uexküll ascribes subjectivity to all animals endowed with an (even minimal) degree of physiological reactivity, even to amoebas and arthropods (such as the tick). Being often regular and predictable, the behavior of such lower animals gives the impression of being nothing more than a series of reactions to the stimuli from the external reality.

Uexküll, however, explicitly considers them as subjects [Uexküll 2010, 45] and stresses their capability to “pick up” the stimuli in a selective way [Uexküll 2010, 81], elaborate them autonomously in the organisms’ *Innenwelt*, and give them meaning as parts of their *Umwelt*.

This approach is likely to appear uneconomic in the analysis of the behavior of lower animals (one could legitimately ask, why to resort to semiotics to explain the behaviour of a scallop or a tick, if this behaviour is otherwise describable?). Uexküll’s choice is, instead, extremely fruitful in the investigation of higher animals, in particular social ones (not surprisingly, the young Konrad Lorenz uses many Uexküllian concepts to describe the social behavior of birds [cf. Lorenz 1970]). What matters most, if we consider the theoretical context of the long-term quarrel between mechanists and vitalists, Uexküll’s approach appears well grounded. The Estonian biologist prefers the risk of using concepts that are apparently too complex for the low levels of the animal world to the opposite peril of simplifying the behavior of higher animals by using a mechanizing toolkit (such as reflexes, tropisms, instincts). Moreover, according to the vitalist Uexküll, to assign subjectivity also to lower animals is a necessary preliminary step in order to gain insight into the complex net of inter-specific relationships. For Uexküll, organic nature is pervaded by teleological forces providing an overall agreement among the needs and actions of the different agencies (i.e., the different species). Uexküll often refers to these harmonizing forces with the term «natural factor [*Naturfaktor*]» [Uexküll 1909, 13; all the quotations from Uexküll 1909 are my translation]; and, if on the physiological, morphological, and anatomical level the expression of the *Naturfaktor* is the organism’s *Bauplan* (its species-specific construction plan [cf. Brentari 2015, 57-63]), on the behavioural level its direct expression is subjectivity, as organising kernel of perception and action. In this way, Uexküll’s anti-mechanistic stance acquires a decidedly teleological dimension.

The second key trait of Uexküll’s concept of the subject is its Kantian derivation. Uexküll reads at a young age the *Critique of Pure Reason*, which has a permanent influence on his thought. From the beginning of his activity as a researcher, he tries on the one side to give a physiological basis to the theoretical core of the Kantian transcendental

approach, and, on the other, to investigate the subjective world of experience even of animal species other than humans. «The task of biology» – writes Uexküll programmatically – «is to expand the outcome of Kant’s research in two directions: 1) to take into account the role of our body too, in particular of our sense organs and central nervous system, and 2) to investigate the relationships with the objects of the other subjects (animals)» [Uexküll 1928, 3; all the quotations from Uexküll 1928 are my translation]. If one reads his texts against the background of this statement, it is evident that, for the Estonian biologist, both the research on the sensorimotor apparatus of the different species and the investigation of their cognitive performances are part of a unique investigation of the animals’ transcendental subjectivity.

In his biological reprise of the transcendental approach, Uexküll has made some (often very fruitful) changes to the Kantian theory. First, if, for Kant, only the logical forms of subjective experience can be a priori, in Uexküll’s approach even the material side of experience can be determined at a transcendental level. This research line is closely reminiscent of Max Scheler’s enquiry on the immediate axiological quality of ethical experience [Scheler 1973, 47-48, 71-74; Gasché 2010] and of the phenomenological debate about the existence of a “material a priori” [see Schlick 1969; Husserl 1984]. Since he moves from the physiological structure of the different animal species, Uexküll considers as a priori elements not only space as the general form of sensitivity, but also the particular implementations of this form at the level of the species-specific *Erlebnis*. For example, he sees three-dimensionality as depending on the presence of semi-circular canals – a position wherein, ultimately, the organisms’ *Bauplan* is the key of the subjective experience of each species [Uexküll 2010, 56-57].

Second, Uexküll’s *Umweltlehre* rests on the semiotization of Kant’s transcendental approach. The connection between the external reality – doomed, as the Kantian *noumenon*, to remain unknowable in itself – and the species-specific coordinates of perception and action is thought of as a semiotic operation. «Stimuli from the external world» – writes Uexküll – «are globally translated as a nervous sign language [*in eine nervöse Zeichensprache*]» [Uexküll 1909, 192]; and, as stressed by Thomas Sebeok [Sebeok 2001, 33], even the perceptual and operative



marks that make up the species-specific *Umwelt* are often called perceptive and operative signs (*Merkzeichen* and *Wirkzeichen*) [Uexküll 2010, 122]. What the animal unfolds as a Kantian subject is a peculiar form of semiosis which does not convey any information about the external world (which remains inaccessible in itself) but produces a mutually interconnected network of codes and meanings *in correspondence with* the external objects. The human being, whose experience is broader than that of other species, can produce a larger and more complex network, but certainly not attain the ultimate reality beyond it.<sup>1</sup>

## 2. *The Uexküllian subject as a monad*

The peculiar ways of Uexküll's renewal of the transcendental approach exacerbate a problem that was already present in Kant's work: the risk of the solipsism. In Kant, the consistency among the experience worlds of different subjects bases, ultimately, only on the philosopher's belief in the functional homogeneity of all rational beings. The insertion of content elements into the subject's transcendental theory and, above all, its application to different biological species exacerbate the problem. The different *Umwelten* appear to be neatly separated from each other; they diverge as for life rhythm, spatial articulation, and assigned meanings. From the point of view of the subject that constitutes them, the subjective worlds of a mosquito and of the mammal on which the mosquito feeds seem to have very little in common.

Already the first philosophical readings of the Uexküllian *Umweltlehre* embed the problem of the solipsism in Uexküll's theory into a comparison with the Leibnizian conception of the subject as a monad. In 1939, Harald Lassen dedicates a significant contribution to the

---

<sup>1</sup> Uexküll's modified transcendentalism has a long lasting influence on other scholars. On the one side, Uexküll's attention to the material elements of animal experience stimulates the research that the young Konrad Lorenz dedicates to the innate recognition mechanisms that trigger social birds' instinctive behaviours [Lorenz 1970]. On the other, the semiotization of Kant's theory makes possible the fruitful insertion of the Uexküllian theory in contemporary biosemiotic (from Thure von Uexküll and Thomas Sebeok to Kalevi Kull and many other scholars; for an introduction, cf. Favareau [2009]).

connection between Uexküll's thought and the Leibnizian theoretical coordinates. First, Lassen clarifies a legitimate doubt. Referring to a personal communication from Uexküll, he excludes that Uexküll had a direct knowledge of Leibniz's thought [Lassen 1939, 47]. Second, it provides an accurate reconstruction of the theoretical correspondence between Uexküll's theory of the *Umwelten* and Leibniz' monadology:

Cardinal points of this correspondence are the following:

- 1) There is a plurality of subjective worlds = "*Umwelten*" = "monads".
- 2) They are completely isolated one from another.
- 3) The subject builds up its reality in a quite autonomous way according to an ideal and specific law = plan = conception.
- 4) The individual vital laws harmonize according to an optimal general plan.
- 5) The objective space is denied and regarded as the formalized system of living subjective centres = points of view.
- 6) Therefrom results the difficulty of explaining a causality of unconscious nature, which is independent from the subject.
- 7) From this follows the necessity of speculatively amplifying the conception of "subject" or "monad" as well as finally displacing the problem of reality into the metaphysical-religious sphere of a supreme (divine) monad or subject [Lassen 1939, 49].

It is easy to see how Lassen's «cardinal points» belong to two different groups. On the one hand, there are factors determining the isolation of the subjects; on the other, elements that oppose and lessen such condition. The plurality of the subjects and the autonomy of the *Umwelt* formation process, accompanied as they are by isolation and lack of direct communication, belong to the first group. The conformity of the *Umwelten* to a plan, their mutual harmonization, the replacement of the objective space with a prospective system made of subjective points of views and, finally, the need for a higher-order subject that regulates this system belong to the second group.<sup>2</sup>

---

<sup>2</sup> It may not be clear, at a first glance, how perspectivism can oppose the isolation of the subjects. Both in Leibniz and Uexküll, however, this possibility arises from the resolute affirmation that the different points of view do not constitute numerically separate objects, but (although in their difference) converge on the same object. Thanks to this, writes Uexküll, «you will understand that the theory of the environ-

For each mentioned common point between Uexküll and Leibniz there are precise textual references. I limit myself to three examples. As for the subject's isolation, Leibniz' claim that «monads just have no windows through which something can enter into or depart from them» [Leibniz 1991, 17] finds a correspondence in Uexküll's metaphor of the *Umwelt* as a «solid dividing wall, which surrounds the animal like the walls of a house it built itself and keeps away the whole world and its extraneousness» [Uexküll 1909, 212]. As for perspectivism, both authors think of the relationship between the subjective worlds in terms of a coexistence of different points of view on the same thing. So writes Leibniz:

And as one and the same town viewed from different sides looks altogether different, and is, as it were, perspectivally multiplied, it similarly happens that, through the infinite multitude of simple substances, there are, as it were, just as many different universes, which however are only the perspectives of a single one according to the different points of view of each monad [Leibniz 1991, 24].

In a very similar way, Uexküll compares the variety of the species-specific *Umwelten* to the multitude of images of a field that are reflected in the drops of dew hanging on the grass stalks: «Each of these myriads of drops mirrors all the world with the sun, the mountains, the forests and the shrubs, a magical world within itself. [...] [E]ach one of these innumerable drops does not only shine in the diversity of the shimmering colours, but also possesses its own subjective tone, the one that distinguishes all living beings» [Uexküll 1938, 47-48; all the quotations from Uexküll 1938 are my translation; on this point, cf. also Langthaler 1992, 162-163, and Guidetti 2013, 77-78].

The third common point I want to highlight between Leibniz and Uexküll is the need for a subject of higher order. This need arises both on the epistemic level and on the ontological one. On the epistemic lev-

---

ment has nothing to do with the silly solipsism» [Uexküll 1938, 48]. The opposite opinion is supported by Konrad Lorenz in a 1948 conference devoted to Uexküll [Lorenz 1948].

el, the understanding of perspectivism as a general condition of animal life can happen only if the human observer succeeds in taking a superordinate position from which (s)he can see the different points of view converging, as it has been said, on the same object. This kind of superordinate position is a relative one, as in the case of an ethologist observing the species-specific *Umwelten* that different animals build up based on the same oak [Uexküll 2010, 130]. On the ontological level, instead, the higher order subject can be an absolute one. For both Leibniz and Uexküll, the recourse to an absolute higher-order subject aims at explaining the ultimate origin of the harmony between the different lower-level subjective worlds, even in the absence of a direct communication or interaction between them. In Leibniz, it is the super-monad God who plays this role towards the lower-level monads [Leibniz 1991, 23]. Uexküll, who rejects the existence of a personal God, entrusts the coordinative function between the different species-specific *Umwelten* to a non-self-conscious teleological instance (the already mentioned *Naturfaktor*), or, simply, to Nature. Very clear in this regard is the final passage of *A Foray into the Worlds of Animals and Humans*: «all these different environments are fostered and borne along by the One that is inaccessible to all environments forever. Forever unknowable behind all of the worlds it produces, the subject – Nature – conceals itself» [Uexküll 2010, 135].

### 3. *How to grant harmony to a multi-world nature: the Platonic way*

On several occasions, Uexküll affirms the radical unknowability of the *Naturfaktor*. The latter, therefore, risks moving so far away from the single organisms that Uexküll frequently turns to other intermediate instances, which can account more satisfactorily for the regularities observable in animal life. In some cases, Uexküll's choice is to use the Platonic ideas as mediators between the *Naturfaktor* and the individual life forms – a choice that, as Esposito states, recalls Schopenhauer's strategy to rely on ideas as mediator between the noumenic will and its individual concretizations at the level of representation [cf. Esposito 2020, 39].

In Uexküll's view of animal life, to be qualified as Platonic ideas

are four key spheres of the animal activity towards the elements of the *Umwelt* – in Uexküll’s terminology, four key functional circles (*Funktionskreise*):

The ideas are the meanings of the objects that we see in front of us as colored silhouettes as long as we are tied up in the Platonic sensory cave. The meaning of an object is crucial for the role that the object plays in the drama of life. The meanings are fixed in nature, while the objects change. Every living being needs food, but the objects that for the different living beings serve as food are extremely different [Uexküll 1950, 157; all the quotations from Uexküll 1950 are my translation].

Besides food, the other «primal meanings [*Urbedeutungen*]» [Uexküll 1950, 157] or «basis ideas [*Grundideen*]» [Uexküll 1950, 158] in animal life are the enemy, the reproductive partner and the medium in which the movement of the animal takes place. Uexküll thinks of the relationship between the *Grundideen* and the reference objects in the *Umwelt* as a process of *expression* («the enemy’s idea finds expression in the parasites and in the predators») [Uexküll 1950, 158] or *embodiment* («the idea of the medium is embodied sometimes in water, sometimes in the air, sometimes in the ground») [Uexküll 1950, 158].

On the behavioural level, which includes the relations to the inorganic elements and the intra- and interspecific relationships, Uexküll presents the four *Urbedeutungen* of animal lives as the fixed roles they have to perform. Through the metaphor of the theatre, which can be found both in *Der unsterbliche Geist in der Natur* [Uexküll 1938] and in *Das allmächtige Leben* [Uexküll 1950], the life of an organism is seen as a series of theatrical scenes which come together to make up a whole. To be more precise, Uexküll sees the constitution of the species-specific *Umwelt* as the realization of a peculiar theatrical setting which is irreducible to that of the other subjects. Again, the autonomous spontaneity of the subject in configuring the world of experience leads to a high risk of incommunicability among the actors performing on the world stage. In a dialogue between a mechanistic-minded zoologist and a biologist who, instead, supports the subjective nature of space, time, and, in general, all coordinates of experience, Uexküll qualifies the conception

of the former as «mono-world [*unimondal*]» and that of the latter as «multi-world [*multimondal*]» [Uexküll 1938, 49] (behind the biologist's perspective it is easy to recognize Uexküll's own view of nature).

As mentioned above, Uexküll faces in various ways the danger of the lack of agreement among the different subjects and the species-specific worlds they shape. The main way is the "Leibnizian" use of a supra-subjective instance operating in a teleological sense, i.e., predisposing the *Baupläne* that determine the organisms' anatomy, physiology, perception, and behaviour. This strategy is to be found also inside the theatre metaphor; Uexküll, in fact, qualifies the *Baupläne* as the 'authors' of the drama of the individual lives: «according to the *Umweltlehre*, there are thousands of different life plays on thousands of life stages, each with a different plan as author» [Uexküll 1938, 49].

Next to this main strategy, however, and as its integration, Uexküll adopts also in this context the Platonic strategy of limiting the expressive possibilities of the animal subjects to a few 'ideal' life schemata: «The technique of living nature works with roles as with fixed unities. But roles, even if they reach out to body and space, are not material units, rather platonic ideas, whose spiritual tissue serves as foundation to nature» [Uexküll 1950, 156]. Here, Uexküll's Platonism emerges in a particularly clear way: the four spiritual roles have a marked ontological priority over the physical level of the animal's body structure. This is reinforced by the idea of the ontological prominence of the *Umwelt* (as a subjective creation) over the physical component of the organism: «since any role in any life scenario requires its counterpointistic counter-role, the animal's body is the reflection of its environment, which represents all the counter-roles» [Uexküll 1950, 69]. Thus, the life form of a species is a particular combination of the four *Grundideen* which objectivizes itself in the body structure of the animal and, further, in its *Umwelt* (as a peculiar constellation of *Merkmale* and *Wirkmale*). And this «tissue of vital scenes which are tied to each other through always renewed roles goes well over the borders of single subjective worlds» [Uexküll 1950, 156].

The recourse to Platonic ideas as an explanatory model for the species-specific regularities of animal life forms is a minor strategy in Uexküll's work. Much more frequently, as we have seen, he resorts to

the postulate of a higher-order subject (Nature or the *Naturfaktor*); in other cases, he considers natural processes as regulated by lower-order teleological factors such as the *Bauplan*, or the «rules» that make up the organisms [Brentari 2015, 57-63; 121-123]. In these cases, Uexküll adopts, rather than a Platonic model, an Aristotelian kind of teleology: the idea of the construction plan is close to the concept of entelechy, which, in Uexküll's times, is having a revival with the neovitalism of Hans Driesch [Driesch 1899; Uexküll 1928, 147]. From the explanatory point of view, Driesch' concept of entelechy and, in general, Aristotelian teleology offer clear advantages over the Platonic model. Although super-material, entelechy is thought of as individual, as the species-specific form of a particular organism. Its greater adherence to the individual being allows neovitalist-minded biologists to use it not only to grasp the general basic form of the species but also, for example, to explain concretely the ontogenetic process of embryogenesis – thus assigning to the notion of entelechy the organizing role that, after the full discovery of the functioning of the DNA, scientists will generally give to the genes.

#### 4. Concluding remarks

Uexküll's constant appeal to philosophy is directed to different purposes. On the one hand, the adoption of the Kantian transcendental approach appears to be a founding choice, motivated by the belief that the investigation of the a priori forms and contents of the species-specific *Umwelten* is actually the most valid path for biology. The same can be said for the references to the Aristotelian teleological model, through the mediation of Driesch. As for the references to Plato, two distinct roots can be identified: on the one hand, as we have seen, there is the intent to limit the risky autonomy of the transcendental subject (which can lead to solipsism) through some basic settings of the life form in relation to its *Umwelt* (the above mentioned *Grundideen*). On the other hand, the occasional insertion of the Platonic view of reality in Uexküll's theoretical biology plays the role of an additional weapon, alongside vitalist teleology, against the Darwinism of the late nineteenth and early decades of the twentieth century.



If it succeeds in opposing the materialistic determinism of the Darwinism of his time, the recourse to Platonism has, however, a side effect that clashes with Uexküll's main goal. If, on the one hand, notions such as the fundamental ideas and the pre-established roles are powerful stabilizing factors inside the species-specific biological anlage and ethological repertoire, on the other hand they heavily limit the organisms' freedom and spontaneity. One should not forget that Uexküll's subjectivism has a basilar anti-mechanistic character. It aims at acknowledging the transcendental and semiotic freedom of every animal action, even the seemingly mechanic feeding behaviour of a tick; moreover, for higher species Uexküll opens up the possibility of individual spaces of action [Uexküll 2010, 126]. In domesticated species, animals can even adapt their individual action to particular traits of the *Umwelt* of other species. In front of these cases, the Platonic model of the repetition of fundamental ideas (which determine which *Funktionskreise* are generally viable to the animal) turns out to be too narrow to account for the wealth of animal behaviour.

In conclusion, the composite philosophical toolkit through which Uexküll faces the problems arising from his 'modified Kantism' can give him only limited advantages. The programmatic inaccessibility to empirical research of *Naturfaktor* and entelechies reduces severely the favour such notions can enjoy among 20<sup>th</sup> and 21<sup>th</sup> century scientists. Moreover, Uexküll's refusal of evolution by natural selection precludes him from adopting the most viable strategy to keep together the autonomy of the animal *Umwelten* and their mutual interconnection on the life stage. This is not the place to provide a complete evaluation of the topic, but some elements should be mentioned. Contemporary evolutionism is far from the environmental mechanism that (in the form of the "struggle to survival") characterized late-nineteenth and early-twentieth-century Darwinism. It stresses, instead, the positive survival value of symbiosis, horizontal genomic transfer and other form of synergic interspecific processes [Guerrero *et al.* 2013]. In addition, many scholars today re-evaluate the active and proactive role of the organism, which appears now very far from being mere «raw material» subjected to the joint action of random variations and environmental external pressure [Gould 2002, 1027-32]. Therefore, it is now possible to assign to evolution by



natural selection the role of coordinating and harmonizing the different species-specific *Umwelten*, without any need more to resort to (neo) vitalistic notions, Leibnizian forms of pre-established harmony, or, finally, Platonic idealism.

## References

- Brentari, C. [2015], *Jakob von Uexküll. The Discovery of the Umwelt between Biosemiotics and Theoretical Biology*, Dordrecht/Heidelberg/New York/London, Springer.
- Brentari, C. [2018], Constituting and living the *Umwelt*. Two levels of semiosis in Jakob von Uexküll's environmental theory, in: *Versus. Quaderni di studi semiotici* 127 (2), 303-322.
- Driesch, H. [1899], *Die Lokalisation morphogenetischer Vorgänge. Ein Beweis vitalistischen Geschehens*, Leipzig, Wilhelm Engelmann.
- Esposito, M. [2020], Kantian ticks, Uexküllian melodies, and the transformation of transcendental philosophy, in Michelini, F., Köchy, C. (eds.), *Jakob von Uexküll and Philosophy. Life, Environments, Anthropology*, Oxon/New York, Routledge, 36-51.
- Favareau, D. [2009], *Essential Readings in Biosemiotics. Anthology and Commentary*, Dordrecht/Heidelberg/New York/London, Springer.
- Gasché, R. [2010], A material a priori? On Max Scheler's critique of Kant's formal ethics, in: *Philosophical Forum* 41, 113-126 (Accessed 23 June 2020).
- Gould, S.J. [2002], *The Structure of Evolutionary Theory*. Cambridge (MA)/London, Belknap Press of Harvard University Press.
- Guerrero R., Margulis L., Berlanga M. [2013], Symbiogenesis: the holobiont as a unit of evolution, in: *International Microbiology* 16, 133-143.
- Guidetti, L. [2013], Jakob von Uexküll tra Kant e Leibniz. Dalla filosofia trascendentale alla topologia del vivente, in: *Rivista Italiana di Filosofia del Linguaggio* 7 (2), 66-83.

- Husserl, E. [1984], *Logische Untersuchungen (Husserliana 19)*, Den Haag, Nijhoff.
- Langthaler, R. [1992], *Organismus und Umwelt. Die biologische Umweltlehre im Spiegel traditioneller Naturphilosophie*, Hildesheim/Zürich/New York, Georg Olms.
- Lassen, H. [1939], Leibniz'sche Gedanken in der Uexküll'schen Umweltlehre, in: *Acta Biotheoretica* 5, 41-50.
- Leibniz, G. W. [1991], *Monadology. An Edition for Students*, transl. Nicholas Rescher, Pittsburgh (PA), University of Pittsburgh Press.
- Lorenz, K. [1948], *Referat über J. v. Üxküll*, unpublished transcription by Hilde Fürnsinn of a seminary by K. Lorenz, conserved in the Lorenz-Archive of the KLI Institute for Evolution and Cognition Research of Altenberg, Austria.
- Lorenz, K. [1970], Companions as factor in the bird's environment, in: *Studies in Animal and Human Behaviour*, transl. Robert Martin, Vol. I, London, Methuen & Co, 101–258.
- Scheler, M. [1973], *Formalism in Ethics and Non-Formal Ethics of Values. A New Attempt Toward the Foundation of an Ethical Personalism*, transl. Manfred S. Frings and Roger L. Funk, Evanston (IL.), Northwestern University Press.
- Schlick, M. [1969], Gibt es ein materiales Apriori?, in: *Gesammelte Aufsätze 1926–1936*, Hildesheim, Olms, 19–30.
- Sebeok, T. A. [2001], *Signs. An Introduction to Semiotics*, Toronto, University of Toronto Press.
- Uexküll, J. von [1909], *Umwelt und Innenwelt der Tiere*, Berlin, Springer.
- Uexküll, J. von [1928], *Theoretische Biologie. 2. gänzlich neu bearbeitete Auflage*, Berlin, Springer.
- Uexküll, J. von [1938], *Der unsterbliche Geist in der Natur. Gespräche*, Hamburg, Wegner.
- Uexküll, J. von [1950], *Das allmächtige Leben*, Hamburg, Wegner.
- Uexküll, J. von [2010], *A Foray into the Worlds of Animals and Humans, with: A Theory of Meaning*, transl. J.D. O'Neil, Minneapolis/London, University of Minnesota Press. (Original works published

1934 and 1940; first joint edition in German published 1956).

### **Keywords**

Jakob von Uexküll; Animal Subjectivity; Aristotelian Vitalism; Leibnizian Monadology; Platonic Idealism; Current Evolutionism

### **Abstract**

This paper aims at investigating some philosophical assumptions of Jakob von Uexküll's biological *Umweltlehre*. After a short exposition of Uexküll's (Kantian) idea of the animal subjectivity, the contribution will focus on the correction strategies Uexküll puts into act, in different places of his works, to remedy the main limit of his subjectivism (i.e., the risk of solipsism). We will examine, in particular, three of these strategies, showing that they resume (explicitly or implicitly) some classical patterns of thought of Western philosophy: 1) Aristotelian (neo)vitalistic notions; 2) "Leibnizian" forms of pre-established harmony; 3) Platonic idealism. In the concluding remarks, the paper will highlight some limits of the philosophical toolkit through which Uexküll faces the problems arising from his 'modified Kantism'. This criticism opens up the possibility to assign the role of coordinating and harmonizing the different species-specific *Umwelten* to evolution by natural selection (in the way some current evolutionists think of it).

Carlo Brentari  
University of Trento  
Department of Humanities  
E-mail: carlo.brentari@unitn.it

## SPYRIDON A. KOUTROUFINIS

ORGANISM, SELF, *UMWELT*:  
A NEW APPROACH TO  
ORGANISMIC INDIVIDUALITY

TABLE OF CONTENTS: 1. *The return of the concept of organism*; 2. *Mechanisms as a form of explanation*; 3. *Logic of (biological) mechanisms*; 4. *Logic of organisms*; 5. *Individual self*; 6. *Umwelt*; 7. *Conclusion*.

*1. The return of the concept of organism*

After the discovery of the DNA in the 1950's, 20th century biology focused on the concept of the gene. In the 21st century, however, the concept of organism is regaining its primary role in biological thought. At present there is a rapidly growing literature verifying that living beings are able not only to deeply reorganize themselves but also to modify their genomes [Shapiro 2011; Sultan 2015; Jablonka 2017]. The emergence of a theory of organism requires, however, first the elaboration of a logic of organismic causality that proceeds from organismic phenomenality. In the following I will attempt to outline what I label "logic of organisms". In order to achieve this aim I will first try to articulate a "logic of mechanisms" because it constitutes a sharp contrast to the "logic of organisms".

*2. Mechanisms as a form of explanation*

For decades, Carl Hempel's theory of explanation was the backbone of theorizing about explanation. In contemporary philosophy of biology there is broad consensus that the explanative relevance of biological modeling cannot be captured by Hempel's account. As «life scientists commonly seek to uncover the mechanism responsible for the phenomenon of interest», in the life sciences phenomena are explained by *mech-*

*anisms* [Bechtel *et al.* 2010, 322]. Leading advocates of what is often described as “New Mechanical Philosophy” or “New Mechanism” argue that in many fields of science what is considered a satisfactory explanation requires providing a description of a mechanism. The generation of a phenomenon by a mechanism is demonstrated by a model. In systems biology it is always a computer simulation that shows how the Explanandum results from a mathematical model consisting typically of differential equations [Brigandt 2018, 985]. At the present computer simulations of both small and large systems of equations are considered mechanistic explanations. Complex mathematical models consisting of coupled differential equations have been introduced among other things for the computation of the cell cycle [e.g. Karr *et al.* 2012], genetic and metabolic oscillations, signal pathways within and between cells, and the prediction of the development of spatial patterns during embryonic morphogenesis [Murray 2002; Meinhardt & Gierer 2000]. Mathematics has become indispensable in contemporary biological explanations.

### 3. *Logic of (biological) mechanisms*

Systems biologists employ a variety of different methods depending on the problem to be solved. Systems biologists who model organismic processes as systems of differential equations often focus on the modeling of the dynamics of genetic, metabolic and signal pathways.<sup>1</sup> They also study the behavior of larger network systems constituted by coupling these pathways, such as might occur in embryogenesis.<sup>2</sup> From their perspective, the final-state-directedness of embryogenesis, cell cycle, and other final-state-directed phenomena is thereby reduced to the dynamics of enormously complex systems of positively and negatively coupled biomolecular reactions, represented by positive and negative feedback loops in the corresponding diagrams.

In order to demonstrate how this approach works, I will introduce an exemplary case of the mathematical analysis of a biological system implemented with differential equations. Timothy Gardner, Charles

---

<sup>1</sup> Tyson *et al.* 2003; Murray 2002; Van Hoek 2008.

<sup>2</sup> Meinhardt 2003; Panning *et al.* 2007; Murray 2002; Karr *et al.* 2012.

Cantor, and James Collins presented a model for the mutual regulation of the activity of two genes. This model is often considered a milestone of synthetic biology [Gardner *et al.* 2000]. Both genes transcribe a so-called repressor protein which blocks the activity of the other gene, so that both genes inhibit each other. The dynamics of this system consists of two interwoven causal relationships that can be described by two quantities,  $U$  and  $V$ , which are associated with the concentrations of each repressor protein respectively. The variation of the concentrations of both proteins can be represented by two coupled differential equations [Gardner *et al.* 2000, 339].

$$\frac{dU}{d\tau} = \frac{\alpha_1}{1+V^\beta} - U \quad (\text{formula 1})$$

$$\frac{dV}{d\tau} = \frac{\alpha_2}{1+U^\gamma} - V \quad (\text{formula 2})$$

The quantities  $U$  and  $V$  are *variables* because their values change with time. In modeling, the temporal behavior of variables represents the phenomenon to be explained. In other words, the values of the variables are the Explanandum. The quantities  $\alpha_1$ ,  $\alpha_2$ ,  $\beta$  and  $\gamma$  are *parameters*. Their value is determined by the experimenters. It is important to keep in mind that the dynamics of the system is not merely the result of the time-dependent variables  $U$  and  $V$ , but depends also on the value of the four parameters  $\alpha_1$ ,  $\alpha_2$ ,  $\beta$  and  $\gamma$  which *cannot* be varied by the system's dynamics. Certain combinations of the four parameters lead to a specific behavior of the system, i.e. to specific dynamics of the variables  $U$  and  $V$ .

Parameters are either constants or entail many constants the value of which cannot be varied by the system's dynamics. In most cases all parameters are preset by the model makers and are held constant in experiments with real organisms and corresponding computer simulations. In other words, *parameters are externally fixed factors that cannot be varied by the system's own dynamics*. The reason for this is that those quantities canalize the development of the time-dependent variables so that they are logical presuppositions of the systems possible

dynamics. The parameters are an important part of the Explanans.

A few years ago, van Hoek suggested a metabolic pathway model for the behavior of the bacterium *Escherichia coli*. Following the same methodology as that of the authors introduced above, he employed ten coupled differential equations for the solution of which he used 58 parameters [Van Hoek 2008, 18-20, 45-47]. In the last decade, several research groups performed computer simulations of whole cells. A model of the cell cycle of yeast operating with differential equations was published a few years ago [Panning *et al.* 2007]. In this model the yeast cell is reduced to 36 state variables. For their computation the model makers use 143 parameters. So, on average for the computation of one variable they use four parameters.

*Systems biological models share an essential feature:* They operate on the same *implicit* assumption about the roles of different *causal factors* – variables, parameters, and equations – in dynamics of biological systems. For the purpose of this essay, this is the most important feature of those methods.

I use the term “causal factors” to refer to all factors that contribute to the determination of a dynamic system’s development. In what follows I will use the generic term “factors” to refer to causal factors. In formal models used in both physics and systems biology there are two clearly distinct kinds of factors at work: intrinsic and extrinsic ones.

*Intrinsic factors* of formal models include those factors which are generated by the system’s dynamics itself. They are the time-dependent values of the variables. In formulas 1 and 2 the changing values of U and V are the only intrinsic factors.

*Extrinsic factors* of formal models include all the factors that contribute to the generation of intrinsic factors but are *not* influenced by any intrinsic dynamics, i.e., the respective state of the system. Parameters, such as the quantities  $\alpha_1$ ,  $\alpha_2$ ,  $\beta$ , and  $\gamma$  are extrinsic factors.

In this essay, “intrinsic” means “dependent upon dynamics” and “extrinsic” means “independent of dynamics”.

In the formalisms of systems biology the most complex factors are described by the *differential equations* or *the systems of coupled differential equations* (e.g. formulas 1 and 2) which determine the variation of the variables. Those systems of equations are relations between

the less complex intrinsic and extrinsic factors, i.e. the variables and the parameters. In contemporary formalisms, the formal structures are not influenced by the system's change of states. They are static, which clearly qualifies them as extrinsic factors. As relations between simpler factors, they can be characterized as *second-order extrinsic factors*. Analogously, variables can be understood as *first-order intrinsic factors* and parameters as *first-order extrinsic factors*. A system of coupled differential equations such as the system consisting of formulas 1 and 2, is a single indivisible second-order extrinsic factor.

There is an essential difference between first order intrinsic factors on the one hand and first- and second-order extrinsic factors on the other: Whereas new values of the variables are continuously generated, all extrinsic factors are usually held constant during an experiment or a computer simulation of a process. In other words, all extrinsic factors are static.

In the models of systems biology the number of first-order extrinsic factors are several times the number of the first order intrinsic ones.

#### *4. Logic of organisms*

The distinction between intrinsic and extrinsic factors can be applied to organisms as well if the terms “intrinsic” and “extrinsic” are interpreted as “dependent upon dynamics” and “independent from dynamics” respectively, as introduced above. First-order intrinsic organismic factors are all material and energetic quantities generated by an organism that have an effect on its dynamics, such as the concentration of regulatory proteins, scleroproteins, hormones, ATP molecules etc. This category includes also environmental factors that the organism influences in order to improve the conditions of its life. In this sense, regulated atmospheric humidity and room temperature are first-order intrinsic organismic factors as well. First-order extrinsic organismic factors are all factors that influence but are not affected by an organism's dynamics. Those factors include initial conditions, such as the parental genetic constitution and the environment of a zygote at the time of its fertilization, fundamental laws of nature that determine physicochemical processes, and environmental conditions that cannot be changed by or-



ganismic activity, such as gravitation, radioactivity, geological processes, solar activity, and the forms and quantities of available energy and matter. However, one of the most essential characteristics of life is that the borderline between first-order intrinsic and extrinsic factors is fluent. Especially during evolution of intelligence some of the extrinsic environmental factors just mentioned have been transformed to intrinsic ones. The idea of second-order factors applies also to organisms, as we will see shortly. However, real organisms do not obey the logic of mechanisms for two reasons: *First*, in sharp contrast to those mechanisms, organisms are able to change the value of most quantities that in systems biology models are represented by parameters. In contrast to these contemporary biological formalisms, in real organisms the number of extrinsic factors is only a tiny fraction of the number of all dynamic quantities. In other words, in real organisms the number of first-order intrinsic factors (variables) exceeds by many times the number of first-order extrinsic ones (parameters). *Second*, during growth, regeneration, and re-adaptation of unicellular and multi-cellular organisms and in the embryogenesis of the latter a vast array of new sorts of proteins is synthesized. This requires that the material constitution of each real organism is permanently subject to change. As a result, the structure of an organism is a sequence of permanently generated new relations between its own first-order intrinsic and extrinsic factors, which in current systems biological formalisms are represented by systems of fixed differential equations (e.g. formulas 1 and 2). As noted above, in current biological formalisms those systems of equations are second-order extrinsic factors. In contrast, even in primitive unicellular organisms, relations between both kinds of first-order factors are themselves intrinsic factors. This is the case, since, on the one side, they are permanently varied by the organism's dynamics, even though in some cases only slightly, and, on the other side, they canalize this dynamics. Embryonic processes display an even more radical dynamics. A system of differential equations representing the development of an embryo would have to undergo a transformation that is so radical that not only most of its parameters would have to be replaced by variables but also that formal system's structure – i.e., form and number of the equations themselves – would have to be subjects to permanent radical variation until matu-

urity is reached. To put it in a nutshell: In real organisms second-order factors are necessarily intrinsic factors or, in other words, there are no second-order extrinsic factors in real organisms [Koutroufinis 2017].

### 5. *Individual self*

The term “second-order intrinsic factor” refers to the dynamical and plastic self-perpetuating structure of the organism. In other words, it designates a living being’s most fundamental organizing principle. All aspects of its material and energetic constitution are organized around the maintenance and perpetuation of this form of organization. In a paper published with Terrence W. Deacon I suggest that «a dynamical process organized in such a way that it minimizes the probability that its organization will be lost» may be labeled a *self* [Deacon *et al.* 2014, 417]. Based on this processual understanding of selfhood, a second-order intrinsic factor can be characterized as a “self”. A self is a process that reinforces the synergistic relationship between its elements.<sup>3</sup> The organismic self is «a form of individuality» [Deacon 2012, 309] because in any second-order intrinsic factor the related first-order intrinsic and extrinsic factors become inextricably interwoven so that the whole self-determining process cannot be physically divided into more elementary processes.<sup>4</sup> The individuality of the second-order intrinsic process is due to the inextricable causal interweavement of its permanently occurring first-order processes.

A very widespread position in the writings of contemporary biologists and philosophers of biology who subscribe to a form of materialism that could be described as “scientific materialism” is that organismic dynamics is canalized by *constraints*. Deacon thinks that «self is defined by constraints» [Deacon 2012, 473] and ascribes what he labels the «reflective individuation» of the organism to a «special form of closure» [Deacon 2012, 468]. In his highly sophisticated book *Incomplete Nature*, he claims that organismic order and individuality

---

<sup>3</sup> According to Deacon a self is a synergy of parts that reinforces their synergistic relationship [Deacon 2012, 469].

<sup>4</sup> See also Deacon 2012, 469.

emerge from the canalizing causal action that interwoven dynamical constraints mutually exert on each other. Maël Montévil, Matteo Mossio, and Alvaro Moreno define constraints as «contingent causes, exerted by specific structures or dynamics, which reduce the degrees of freedom of the system on which they act» [Montévil & Mossio 2015, 181], so that «they simplify its description, and contribute to provide an adequate explanation of its behaviour, which would otherwise remain underdetermined» [Mossio & Moreno 2010, 271]. Mossio and Moreno argue that organisms «maintain themselves [...] through a self-maintaining organization of constraints» [Mossio & Moreno 2010, 276] each of which exerts a causal influence on the generation of other constraints while its own generation is reciprocally influenced by some of them so that the whole system of constraints achieves «organizational closure» [Mossio & Moreno 2010, 277, 275-280; Montévil & Mossio 2015, 186f.]. While these authors do not reduce organisms to organizational closure, they claim that the latter «can be taken as an essential *mark* of living organisms» [Mossio & Moreno 2010, 285].

Although I do not doubt the importance of constraints, I think that there are good reasons for not attributing an essential role to constraints within our understanding of organisms. My skepticism is due to the fact that any scientific explanation of organisms articulated by a formal model that allows a quantitative description of the organismic dynamics (e.g. prediction of variables) *cannot forgo mechanisms*. This is true regardless of whether the model is based on organizational closure or any other possible form of constraint-based organization. This means, however, that as soon as constraint-based organization is translated into a formal language, it must be described in mechanistic terms and is thus necessarily subject to the logic of mechanisms. Even if a future model of organizational closure that goes far beyond what is imaginable today succeeds in computing all constraints, the computation will necessarily employ parameters and thus first order *extrinsic* factors that it cannot generate autonomously. Obviously, insofar as these extrinsic factors act as constraints on the computation of variables, this model of organismic dynamics is not organizationally closed. In other words, organizationally-closed systems of constraints are nothing but attractive narrations that might be possible within natural languages but immediately col-

lapse as soon as they are articulated in formal languages that operate with mechanisms. For this reason, I think that an alternative understanding of organismic selfhood must be developed which is based on metaphysical assumptions that are alien to contemporarily established scientific materialism.

Before undertaking such an attempt it is important to consider that there is a «critical but contingent relationship between selves and physical boundaries» that complicates the identification of biological selves [Deacon 2012, 471]. Since any living being maintains itself through a selective exchange with its environment, we must bear in mind that «[t]he organism is not a solitary, self-creating artist» [Wolfe 2010, 206]. Hence, any adequate theory of organismic selfhood and individuality must necessarily be an organism-environment theory.

## 6. Umwelt

An organism incorporates within its organization information about those aspects of its environment that are relevant to its self-perpetuation and reproduction. This information is embodied in the specific organization of the set of processes that maintain organismic integrity with respect to potentially beneficial or harmful aspects of its environment. In 1909, Jakob von Uexküll introduced the term *Umwelt* referring to those features of a living being's environment to which it is sensitive [Uexküll 1909]. In other words, *Umwelt* refers to those features of a living being's surroundings that are meaningful to it. Therefore *Umwelt* may be translated as “meaningful environment”. The creation of a self-other boundary by the organism incorporates a representation of its *Umwelt* [Deacon *et al.* 2014, 417]. *Umwelt* and self are two sides of the same coin. This is characterized by biosemiotician Kalevi Kull's translation of *Umwelt* as «self-centered world» [Kull 2010, 348-349].

Uexküll's work deserves particular attention because he not only created an organism-environment theory but anchored it in the philosophy of Immanuel Kant which clearly does not subscribe to a metaphysics of scientific materialism. Of course, this applies also to the theories of other seminal thinkers of the last century, such as Bergson, Whitehead, and Jonas. However, Uexküll succeeded more than anybody else

in the elaboration of an organism-environment theory that is grounded both philosophically and biologically.

Uexküll considers animals *subjects*, which in virtue of their structure select stimuli within their surroundings and respond to each in a specific way. The stimuli build «certain indications [*Merkmale*], which enable the animal to guide its movements, much as the signs at sea enable the sailor to steer his ship» [Uexküll 1926, 126]. Many indications are merged together into coherent units that occupy a moment and a place or a direction in space [Uexküll 1926, 78, 97-99]. Uexküll calls them “things” (*Dinge*). Those units are instantaneous data of experience. “Things” are events rather than persistent entities. Animal and human subjects synthesize them unconsciously [Uexküll 1926, 93]. The unconscious creative process also creates more complex cognitive entities – “objects” (*Objekte*). An object is an enduring thing, a thing extended in time. It is an enduring sequence of data of experience that occupies a particular spatiotemporal region in the subject’s perceptual field. Objects constitute higher units of experience than things [Uexküll 1926, 98] and can be involved in lawful causal relations. Uexküll calls objects that possess a framework merging their parts into an organized whole “implements” (*Gegenstände*). Implements occupy the highest level of complexity. They are objects in which «the parts stand in the same relation to the whole as the individual sounds to the melody» [Uexküll 1926, 103]. Implements are organized wholes of data of experience. The perceptual environment of both humans and most animals is constituted by these three kinds of cognitive entities: things, objects, and implements.

According to Uexküll, all three are differently complex products of one and the same unifying process, the so-called *apperception process* [Uexküll 1926, 78]. The apperception process lies at the root of all perception [Uexküll 1926, 15]:

Whatever the perception, the activity is of the same kind; different qualities are constantly being associated into unities. The power of the subject [*Gemüt*] that exercises this apperceptive activity is for ever creating new structures; in its very nature, it is a formative force [*Bildungskraft*] [Uexküll 1926, 16].

An important fundament of Uexküll's epistemologically-founded biology of subjects is the assumption that the apperception process, although lawful, *cannot be mathematically described* [Uexküll 1926, 45]. For this and other reasons, biology cannot be reduced to physics [Uexküll 1926, 33, 46, 70, 71, 91, 103] and biological explanation cannot be reduced to mechanisms. Uexküll's conviction about the non-reducibility of biology to physics is supported by Kant's concept of *pure* or *original* or *transcendental apperception*, which is the underpinning philosophy of Uexküllian apperception process. In his *Critique of Pure Reason*, Kant introduces pure apperception as a *spontaneous a priori activity* of the subject. It synthesizes the manifold of its representations to a unity without being determined by the nature of the synthesized elements (the representations) [Kant 1998, B 129-132].

Combination does not lie in the objects [...] but is rather only an operation of the understanding, which is itself nothing further than the faculty of combining a priori and bringing the manifold of given representations under unity of apperception, which principle is the supreme one in the whole of human cognition [Kant 1998, B 134-5].

According to Kant, the unity of perceived data in all our representations «can be executed only by the subject itself» [Kant 1998, B 130] that is by a *transcendental* factor that can never be an empirical content of human perceptions. Kant's conviction that the unity of experience is executed only by the subject goes against the objectivism and anti-transcendentalism which characterizes physics and biology at present and in Uexküll's time.

Kant's transcendental philosophy was framed uniquely for human subjects. Uexküll extended Kant's theory of subjectivity to a general biological theory that he applied to both human and animal subjects. He considers human and animal subjects to be transcendental, spatio-temporally non-localizable unities of apperception. The apperception process unfolds lawfully and determines the synthetic process of perception. For that reason, the apperception process can be considered the central category of subjectivity. All three kinds of cognitive entities – things, objects, and implements – are products of *synthetic activi-*

*ties* that constitute different manifestations of the apperception process which is a spontaneous act of synthesis. Due to its spontaneity, the synthesis of cognitive elements to a more complex unit is a creative mental act that is neither determined by the nature of the synthesized elements nor by the relations between them.

Despite the fact that Uexküll aimed «to extend Kant's transcendental philosophy to the entire living realm» – an attempt that Kant would likely reject – «both shared the same solution: subjective spontaneity» – and considered «the subject as the center of initiatives and not as a recording black box» [Esposito 2020, 38f.].

Uexküll's theory of *Umwelt* can be extended to a theory of the organism's internal organization. In contemporary biosemiotics the cells of a multicellular organism are considered subjects that communicate through the intensive exchange of molecules serving as signs. In other words, the cells of an organism interact with each other through continual processes of mutual interpretation. From an Uexküllian perspective, a multicellular organism is the *Umwelt* of its own cells or, in the words of Claude Bernard and George Canguilhem, a «*milieu interieur*»:

From the biological point of view, one must understand that the relationship between the organism and the environment is the same as that between the parts and the whole of an organism. The cell is a milieu for intracellular elements; it itself lives in an interior milieu, which is sometimes on the scale of the organ and sometimes of the organism; the organism itself lives in a milieu that, in a certain fashion, is to the organism what the organism is to its components [Canguilhem 2008, 111].

## 7. Conclusion

The second-order intrinsic causal factor is the plastic self-determining material-energetic structure of the organism. It is the organismic self that determines both the relation between the internal parts of the organism and the relation between the organism and its *Umwelt*. Its individuality is rooted in the inextricable interweavement of both rela-

tions. From the anti-mechanistic perspective that I have defended in this essay, the self is the manifestation of a creative subject that transcends the logic of mechanisms for principal reasons. The organismic subject, which is the cause of the self, may be approached from the perspectives of various philosophers, such as Whitehead, Bergson, Jonas, and Uexküll. In this essay, I have focused on Uexküll because he considered more thoroughly than any other thinker the causal and logical interweavement of subject, organism, and environment.

From an Uexküllian perspective, if the organism is understood as the *Umwelt* of its own components, *the generation and transformation of the second-order intrinsic factor – which is the organism's plastic structure – must be conceived of as the product of a creative spontaneous subject, the activity of which transcends any known form of mechanism.*

## References

- Bechtel, W., Abrahamsen, A. [2010], Dynamic mechanistic explanation. Computational modeling of circadian rhythms as an exemplar for cognitive science, in: *Studies in History and Philosophy of Science* 41 (3), 321-333.
- Brigandt, I. [2018], Explanation of molecular processes without tracking mechanism operation, in: *Philosophy of Science* 85, 984-997.
- Canguilhem, G. [2008]. The living and its milieu, in: G. Canguilhem, *Knowledge of Life*, New York, Fordham University Press, 98-120.
- Deacon, T.W. [2012], *Incomplete Nature: How Mind Emerged from Matter*, New York, Norton & Co.
- Deacon, T.W., Koutroufinis, S.A. [2014], Complexity and dynamical depth, in: *Information* 5, 404-423.
- Esposito, M. [2020], Kantian ticks, Uexküllian melodies, and the transformation of transcendental philosophy, in: F. Michellini, F. and K. Köchy (eds.). *Jakob von Uexküll and Philosophy. Life, Environments, Anthropology*, London, New York, Routledge, 36-51.
- Gardner, T.S., Cantor, C.R., Collins, J.J. [2000], Construction of a genetic



- toggle switch in *Escherichia coli*, in: *Nature* 403 (6767), 339-342.
- Jablonka, E. [2017], The evolutionary implications of epigenetic inheritance, in: *Interface Focus* 7 : 20160135. <http://dx.doi.org/10.1098/rsfs.2016.0135> (Accessed 19 October 2020).
- Kant, I. [1998]. *Critique of Pure Reason*, Cambridge, New York, Cambridge University Press.
- Karr, J.R., Sanghvi, J.C., Macklin, D.N. [2012], A whole-cell computational model predicts phenotype from genotype, in: *Cell* 150 (2), 389-401.
- Koutroufinis, S.A. [2017], Organism, machine, process. Towards a process ontology for organismic dynamics, in: *Organisms. Journal of Biological Sciences* 1 (1), 23-44, DOI: 10.13133/2532-5876\_1.8 (Accessed 11 March 2020).
- Kull, K. [2010], Umwelt, in: P. Cobley (ed.), *The Routledge Companion to Semiotics*, London, Routledge, 348-349.
- Meinhardt, H., Gierer, A. [2000]. Pattern formation by local self-activation and lateral inhibition., in: *BioEssays* 22 (8), 753-760.
- Meinhardt, H. [2003], *The Algorithmic Beauty of Sea Shells*, Berlin/Heidelberg/New York, Springer.
- Montévil, M., Mossio M. [2015], Biological organization as closure of constraints, in: *Journal of Theoretical Biology* 372, 179-191.
- Mossio, M., Moreno, A. [2010]. Organisational closure in biological organisms, in: *History and Philosophy of Life Sciences* 32 (2-3), 269-288.
- Murray, J.D. [2002], *Mathematical Biology*, New York, Berlin, Heidelberg, Springer.
- Panning, T.D.; Watson, L.T.; Tyson, J.J. [2007], A mathematical programming formulation for the budding yeast cell cycle, in: *SIMULATION* 83(7), 497-514.
- Shapiro, J.A. [2011], *Evolution: A View from the 21st Century*, New Jersey, FT Press Science.
- Sultan, S.E. [2015], *Organism & Environment*, Oxford, Oxford University Press.
- Tyson, J.J.; Chen, K.C.; Novak, B. [2003], Sniffer, buzzers, toogles and

blinkers: dynamics of regulatory and signaling pathways in the cell, in: *Current Opinion in Cell Biology* 15 (2), 221-231.

Uexküll, J. v. [1909], *Umwelt und Innenwelt der Tiere*, Berlin, Springer.

Uexküll, J. v. [1926], *Theoretical Biology*, New York, Harcourt, Brace, London, Kegan.

Van Hoek, M.J. [2008], *Evolutionary Dynamics of Metabolic Adaptation*, Utrecht, Utrecht University.

Wolfe, C.T. [2010], Do organisms have an ontological status?, in: *History and Philosophy of the Life Sciences* 32, (2-3), 195-231.

## Keywords

Organism; *Umwelt*; Uexküll; Constraints; Mechanisms; Self; Kant

## Abstract

Organisms exhibit a specific form of biological individuality. In contemporary biosciences, explanations of organismic dynamics are often reduced to mechanistic descriptions. It is taken for granted that complex biological processes of different kinds are reducible to molecular and other “mechanisms”. In this paper, I show (1) that organisms express a form of individuality that is realized by a particular kind of causality and (2) that organismic causality transcends the logic of mechanisms used in contemporary biosciences. Based on new insights about organismic dynamics as well as Jakob von Uexküll’s concept of “*Umwelt*” (meaningful environment), I analyze organismic causality and show that the latter constitutes a form of selfhood alien to both inorganic nature and mechanisms.

Spyridon A. Koutroufinis

Privatdozent at the Institute for Philosophy and History of Literature,  
Science, and Technology of the Technical University of Berlin

E-Mail: kout1967@mailbox.tu-berlin.de



**ISSN 2284-2918**