ECOLOGICAL PHILOSOPHY AND ITS APPLICATIONS: FOLLOWING FÉLIX GUATTARI'S TRADITION

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ABSTRACT: The philosophical meaning of some ideas of modern ecology is revealed in this article, and the possibility of applying an extended ecological approach in scientific research, management and educational activities is substantiated. The heuristic character of the concept of ecosophy, introduced by the Norwegian philosopher Arne Næss and the French semiotician and psychiatrist Félix Guattari, is shown. It is argued that ecology today is not limited to the idea of coexistence and co-evolution of man and nature, but might be understood as an ecology of mind, of knowledge, of action, of communication, of management, and of education.

KEYWORDS: Ecology; Ecophilosophy; Ecosophy; Extended ecological approach; Ecological philosophy; Evolutionary holism; Deep ecology; Guattari; Universal evolutionism

IDEAS OF EVOLUTION AND ECOLOGY: A TREND TOWARDS UNIVERSALIZATION

The development of ecological philosophy is in line with a broader understanding of ecology than a field of biology or a sphere of relations between man and nature. This is not just the perspective of the philosophy of ecology.[1] Such a broader understanding is directly related to a significant extension and universalization of the concept of evolution, expressed in the modern concept of universal (or global) evolutionism. The very content of the concept of "evolution", which was

[1] Justus, James, *Philosophy of ecology: an introduction*, Cambridge, UK; New York, NY: Cambridge University Press, 2021.

previously considered as applicable mainly to living nature, is becoming much richer. The concept of "evolution" includes all those meanings that filled the concept of "development", through which the individual development of man (ontogenesis) and the development of mankind (phylogenesis) have been comprehended, and new meanings are added to it that appear due to a systemic theoretical vision. A rapid development (progress) and periods of return and stagnation, the deployment of opportunities and their collapse, the continuity of the course of history and leaps - all this is covered by the extended concept of "evolution". The second argument for such an extension is that the development of nature is only a fragment of a global, or universal, evolutionary process. An attempt to understand all the points of contact of evolution and development is the current *evo-devo-perspective*.

After Darwin, the idea of evolution underwent a double synthesis. The first synthesis is the combination of Darwin's evolutionary teachings with G.J. Mendel's genetics. Darwin studied and described diversity within the species; its causes were understood with the discovery of the laws of genetics. The second synthesis is the conjunction of the idea of the evolution of species with the theory of the development of individual living organisms, phylogenesis and ontogenesis. Phylogenesis has been traditionally interpreted in the conceptual framework of evolution (evo), whereas ontogenesis has been considered in the conceptual framework of development (devo). Their combination gives evo-devo-perspective, also called evolutionary developmental biology. The addition of the ecological aspect to this theoretical framework, which can be understood in an extended, interdisciplinary, and not only in a narrow biological sense, led to the emergence of the *eco-evo-devo-perspective* as a research strategy in various branches of scientific knowledge, which received impulses for its development from modern biology.[2] The addition of the cognitive aspect (after all, life itself is cognition) and of the aspect of the theory of complexity (living systems are complex par excellence) attaches this research strategy a genuine interdisciplinarity. These integrating theoretical frameworks allow to study such mechanisms as plasticity of development, epigenetic inheritance, genetic

[2] Love, Alan C. (Ed.), *Conceptual Change in Biology: Scientific and Philosophical Perspectives on Evolution and Development*, Dordrecht: Springer, 2015; Sansom, Roger and Brandon, Robert N. (Ed.), *Integrating Evolution and Development: From Theory to Practice*, Cambridge, MA: MIT Press, 2007; Wallace, Arthur, *Evolution: A Developmental Approach*, Chichester, West Sussex: Wiley-Blackwell, 2011.

assimilation, the construction of ecological niches and the symbiosis of life forms. The beginning of research on eco-evo-devo synthesis dates back to the 1980s. And today it has not yet been completed, but significant advances in research work in this direction are quite obvious.

Following the concept of "evolution", the concept of "ecology" undergoes its extension. The ecological perspective in modern scientific research is becoming no less important than the evolutionary one. This is why *eco* connects with *evo-devo*. The ecological approach goes far beyond its original field of biological knowledge. It turns out to be promising in various fields of natural science, social and humanitarian knowledge, including medicine. Today they talk about the ecology of action,[3] of mind,[4] of life, cognition and creativity, thought and word, ideas, communication and management. There are some reasons to consider such an *extended ecological approach* as a tool for an interdisciplinary synthesis of knowledge. The theoretical basis for this extension is the following concepts: "active adaptation", "cognitive (social, cultural, economic or market) niche", "co-evolutionary landscapes" and "Umwelt" as the life world of an organism and the world of its meanings.

In terms of theoretical biology and biomedicine, one can speak not only in the usual sense about the impact of the state of environment and consumed food on our health, but also about the ecology of health (healthy life) and the ecology of lifestyle management, of nutrition and treatment. This is not only about maintaining homeostasis, more or less stable functioning of the systems of one's body, not only about the influence of one's lifestyle on the health of his or her family and a healthy atmosphere in his or her work team, but also about the mutual creation of oneself and the environment, the enactive activity of a person as a living being, about co-evolutionary landscapes as complex configurations of mutually adjusted ecological, cognitive, life niches.

The French philosopher Félix Guattari urged us to "learn to think transversally".[5] To think transversally means to think in a cross-cutting way. And where cross-cutting intentions of thought appear, an exit is made first to a meta-scientific level, and then, possibly, to a universal level, that is to philosophy. The

[3] Morin, Edgar, *Seven complex Lessons in Education for the Future*, Paris: UNESCO, 2001.
[4] Bateson, Gregory, *Mind and Nature: A Necessary Unity*, Cresskill, N.J.: Hampton Press, 2002.
[5] Guattari, Félix, *The Three Ecologies*, London and New Brunswick (NJ): The Athlone Press, 2000, p. 43.

principles of complex thinking developed by E. Morin,[6] including the principle of auto-eco-organization, autonomy and dependence of living beings, which, being self-organizing, spend their energy in the environment in order to maintain their autonomy, they are able to maintain its integrity in a changing geo-ecological environment.

In a sense, the environments themselves, the surrounding world in which living organisms and human individuals live and act, possess wisdom. That is, every living being is not a separate entity, but a network of its actions. It is, in fact, not localized, but distributed in its environment. The concept of ecosophy, along with the concept of deep ecology, was coined into scientific circulation by Arne Næss and widely used by his followers.[7] Subsequently, the concept of ecosophy was developed by Félix Guattari, who gave it new meanings. The ecosophy of Guattari and the deep ecology of Arne Næss certainly have common roots, but Guattari adds important new dimensions to ecosophy: anthropocentric and semiotic implications.[8] Both ecosophy and deep ecology lie in the mainstream of the thought developed here.

The concept of "ecosophy", or ecological philosophy, can be included in the conceptual row of that vision of the world, which is based on modern concepts of the theory of evolution and self-organization of complex systems. Living organisms, separate individuals and groups of people have activity, intentionality, selective attitude to stimuli coming from the environment. In modern cognitive science, it is shown that behavioral intentionality is characteristic for living organisms in general; for a human, the intentionality of consciousness is also added as a main characteristic of consciousness from the point of view of philosophers-phenomenologists. The "scissors of perception" of a living creature, as Henri Bergson said, "cut out" from all the diversity and splendor of the environment only what is meaningful and significant for his life and activity.

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[6] Morin, Edgar, 'La Besoin d'une pensée complexe', in *Représentation et Complexité*, Paris : Educam/UNESCO/lSSC, 1997, p. 87-93.

[7] Næss, Arne, *Ecology, Community, and Lifestyle: Outline of an Ecosophy*, Cambridge; New York: Cambridge University Press, 1989; Næss, Arne. *Ecology of wisdom*, Berkeley, CA: Counterpoint, 2008; Witoszek, Nina and Mueller, Martin Lee, 'Deep ecology: Life after Life?', *Worldviews: Environment, Culture, Religion*, vol. 21, no. 3, 2017 pp. 209-217.

[8] Levesque, Simon. 'Two Versions of Ecosophy: Arne Næss, Félix Guattari, and Their Connection with Semiotics', *Sign Systems Studies*, vol. 44, no. 4, 2016, p. 526.

"Unorganized bodies are cut out of the tissue of nature by perception, the scissors of which as if follows the dotted lines that determine possible seizure of actions".[9] Therefore, different living beings live in different worlds of perception and action and may not understand each other. They talk about the cognitive isolation of the worlds of living beings. The degree of selectivity increases with an increase in the complexity of living beings, and for a human - with the development of his personality, for networks of the collective mind - with their growth and development and the appearance of nodes of different ranks.

However, if we assert that the environment itself is active, that it provides opportunities for the activity of living organisms as cognitive agents and people as biosocial subjects, this is not so obvious anymore. Generally speaking, something in this respect can be seen already in Aristotle, in his idea of the activity of form and finalism. It is the form that turns a clot of substrate into a thing; it is a goal cause (that for the sake of which) determines the place of a thing in nature or in the structure of human activity. The mutual activity of the forms that create a harmonious world determines its purposeful and optimal structure and the fact that nothing is done in it in vain.

In the Twentieth Century, this found expression in the ecological theory of perception by J.J. Gibson. He introduces the concept of "*affordance*".[10] U. Neisser explains J. Gibson's concept of affordance as follows: ""The floor affords a possibility to walk on it, a pen affords a possibility to write, etc. … Possibilities afforded by an object—or, in other words, its meaning—depends on who perceives it. Every natural object can have a great number of ways of use and of potential meanings, and every luminous flux specifies an infinite multitude of possible properties. The perceptive subject makes a choice from these properties and affordances due to a specific preparedness to perception of some of them".[11] A pen provides an opportunity to write with it; paper provides an opportunity for us to notice what is written with a pen; a table on which the paper lies provides us with an opportunity, the paste in the pen would drip freely, and the written letters would be distinguishable for us. Why isn't the world of active forms and

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[9] Bergson, Henri, *Creative evolution*, New York: Henry Holt & Co., 1998, p. 48.
[10] Gibson, James Jerome, *The ecological approach to visual perception*, Hillsdale, N.J.: Erlbaum, 1986.
[11] Neisser, Ulric, *Cognition and Reality: Principles and Implications of Cognitive Psychology*, San Francisco: W. H. Freeman, 1976, p. 92.

mutual expediency of Aristotle for you? Not only the environment is built from the perception and action of a cognizing organism, but the environment itself is active, it provides opportunities, *affords possibilities* that may or may not be perceived by a cognitive agent. From the modern point of view, we can only talk about quasi-expediency and quasi-teleology, since they are determined by the nature of nature itself, and not by the presence of a certain creature, say, a philosophically understood God as in Aristotle's teachings.

Explaining the concept of embodied cognition in one of my previous works, I wrote that a living being perceives and cognizes the world, not only with the brain, but also with the whole body: he cognizes by acting.[12] The whole body, therefore, can be called "thinking", cognizing. In that case, a loop of mutual conditioning goes beyond the philosophical dichotomy of mind and body (the mind-body problem) and extends to an organism and its environment as a cognitive agent or a human as a cultural and social actor. A fragment of the natural environment assimilated by a living organism and having significance for it, a semantic slice of nature is its Umwelt. This environment can be called *wise*, albeit in a metaphorical sense, since a) this environment is active and bears the stamp of the activity of a living being; b) it is often impossible to draw a clear line between where the body of a living creature ends, and where the environment of its activity begins; c) the environment captures traces of the activity of a living organism, therefore it has a memory; according to the cognitive maps of the environment, a living creature builds its future activity; d) a living organism and the environment of its activity constitute a unity (against the Cartesian dichotomy of body and mind), e) in biological terms, the organism and the environment have come a long way of co-evolution towards each other, mutually adapting to each other. In my opinion, the notion of *wisdom of the environment* is a good demonstration for revealing the meaning of the concept of ecosophy. Besides, this notion corresponds to the modern conception of *extended mind* in cognitive science.[13] The main thesis of this conception is that the cognitive process that builds the psyche of a living organism or the mind of a human goes beyond an individual and includes some corresponding aspects of an individually colored

[12] Knyazeva, Helena, 'Nonlinear Cobweb of Cognition', *Foundations of Science*, vol. 14, no. 3, 2009, pp. 167–179.
[13] Clark, Andy, Chalmers, David, 'The Extended Mind', *Analysis*, vol. 58, no. 1, 1998, pp. 7-19.

natural or sociocultural environment. The rationality of behavior of a living creature, the wisdom and intelligence of a human are diffused in the products of his activity, in a small world that is significant for him.

One of the most important conclusions from the development of an extended ecological approach is that the ecological approach is holistic, entire and integrated; and holistic thinking, respectively, is complete, comprehensive, full, total, integrated thinking. From the standpoint of an ecologist, integrity is the undisturbed relationship in a system, its stability. Within the extended ecological approach, integrity means the indissolubility and reciprocity of the links between an acting and cognizing agent (a living being or a human) with his environment.

FÉLIX GUATTARI'S ECOSOPHY

The concept "ecosophy" developed by Félix Guattari literally means the wisdom of an immediate environment, natural habitat, home living conditions. Guattari explains that the root "eco" in the word "ecosophy" is used in its original ancient Greek sense "oikos" which signifies "home", "home environment", "natural environment" (Old Greek: οἶκος - dwelling, habitation, lodging, quarters, housing; house, room, rest). The ecological approach from the point of view of Guattari has three levels, or registers: the level of the environment (environmentalist), the level of social relations and the level of human subjectivity.[14] We are in the world and the world is in us, and, first of all, our micro-society, our immediate environment, our natural, social and cultural surroundings, the one in which we live. We are both creators and created at the same time, since we create our environment, our ecological home and at the same time are constantly created by it, we experience its impact on ourselves, which transforms us. The world opens up for us in a certain aspect, section, in certain senses, and we draw from it, "cut out" only a part that is accessible and meaningful to us, its fragment. We are both open and closed to the world, that is, we are *operationally closed.* Openness to the world allows us to communicate and to develop, and isolation allows us to maintain our personal identity, our Self, not to be blurred in the environment. This our isolation is cognitive (perceptual and mental) and at the same time semantic isolation: we live in a semantic reality that opens up to us, and these meanings build ourselves.

[14] Guattari, *The Three Ecologies*, p. 28.

Thus, according to Guattari, ecosophy takes on three dimensions (environmental, social and mental); in other words, the environment affects us in three interrelated ways:

1) environmentalist, first of all, as a natural environment,

2) social (as an environment of social connections and social actions) and

3) individual and personal, as a field for individualization, personality development, and the deployment of one's own creativity.

It is in this latter sense that Gregory Bateson spoke of the ecology of ideas and mind. Having made a significant contribution to the development of a kind of cybernetic psychology, Bateson introduced the concept of "double bind", which is used to explain the origins of schizophrenia associated with a failure to appreciate the different contexts of communicative acts. In my opinion, the 'double bind' might be viewed as nonlinear cyclical causality, ambiguity and retroactivity of the relationship established between an individual mind and its environment, other individuals with whom it communicates. In this case, the individual mind goes beyond its bodily certainty and dissolves in its ecological environment, in the networks of the collective mind. The individual mind is immanent, but not only to the body, but also to circuits and messages outside the body. There exists also a great mind, in which the individual mind is only a subsystem.[15]

Not only man is active in his social and individual actions, but activity also flows from the environment itself. Not only we, but also the environment builds us, teaches and creates us. The environment itself is wise in the sense that it has a certain resistance, is to a certain extent rigid, even "willful", since it does not accept any of our cognitive or practical actions. The environment is partly flexible, because it "mirrors" and adjust itself finely to those of our actions that are defined and debugged in the course of natural evolution and cultural history. In this sense, the concept of ecosophy, developed by Guattari, is coupled with the concept of Umwelt introduced by J. von Uexküll,[16] and with the conception of

[15] Bateson, *Mind and Nature: A Necessary Unity*.

[16] Uexküll, Jakob von, *Streifzüge durch die Umwelten von Tieren und Menschen. Bedeutungslehre*, Frankfurt am Main: S. Fischer Verlag, 1970.

the embodied and enactive mind laid down by F. Varela.[17]

According to Uexküll, Umwelt is a world of meanings. This concept emphasizes the subjectivity and semantic certainty of the world of a living being. Uexküll also calls animals, not only humans, as subjects of perception and action. Uexküll put a number of original meanings into this concept, which are correlated with the concept of Guattari's ecosophy, namely:

1. the *conjugation of active perception with active action*: living beings create the world around them for their own benefit and their needs, adjust it for themselves, perceiving it;
2. *cycles of feedback* of a living organism and its environment (functional circles);
3. *selectivity of perception and action*: only a certain fragment (cut) of the external world is captured through an animal's sense organs, converted into its nerve impulses and stimulates its psychomotor activity; not all, but only a few stimuli from the outside world are important for the life of an organism;
4. *extraction / generation of meanings*: Umwelt is something that is significant and carries meanings for a living organism, in contrast to the environment (just the surrounding world); for all living things, reality is revealed as full of signs;
5. *there is a movable, dynamic border between the external and the internal*: a border between an organism and its Umwelt is hardly perceptible. A living creature draws the surrounding world into itself, transforms the external into the internal, and distributes itself, "scatters" itself in the environment. A spider's web is, in a sense, a part of the spider itself;
6. the *interactive unity of a living being and its Umwelt*: the objective external world and the subjective internal world are in a relationship of mutual determination. A living being is partly outside himself, in his actions and in their products (a beaver in the platinum he built, a swallow in a nest molded by it), and a significant part of the outside world is involved in their actions, built into their own nature, put at their service.

Discussing Uexküll's conception of Umwelt, Guattari in his joint book with J. Deleuze, Guattari calls it the conception of melodic, polyphonic, contrapuntal

[17] Varela, Francisco, 'Patterns of Life: Intertwining Identity and Cognition', *Brain and Cognition*, vol. 34, no, 1, 1997, pp. 72–87.

nature".[18] They emphasize the subtle interplay of mutual repulsion and attraction, isolation and dissolution of the small world of an individual living being in the large Universe. Such an interplay of a living creature on a universal scale and with its close and more distant neighbors has a rhythmic character and constitutes a plastic and melodic landscape. Uexküll's concept, as Deleuze and Guattari emphasize, is not finalist in the spirit of Aristotle, but melodic. The environment of a living organism, its small eco-world, its Umwelt, its territory does not just delimit and connect, it also opens up to cosmic forces that rise from within or come from outside, and makes their impact on an inhabitant. "If nature is like art, this is always because it combines these two living elements in every way: House and Universe, Heimlich and Unheimlich, territory and deterritorialization, finite melodic compounds and the great infinite plane of composition, the small and the large refrain.[19]

The new ecosophical logic, discovered by Guattari in nature itself, makes it possible to understand not only the small eco-worlds of living beings, but also the ways of their restructuring due to the passage through singularities, the invasion of accidents, which allows discovering new meanings, completing and transforming their own territories. Eco-worlds are flexible, capable of being sensitive to accidents that "suddenly force the initial project to bifurcate, make it deviate far from the original channel".[20] The events of passing through points of singularity, breakdowns, catastrophes rebuild the world of life, opens up new meanings to living creatures including humans. The flexibility of individual eco-worlds (complex systems of living beings) is an unlimited potential for their permanent change.

AN EXTENDED ECOLOGICAL APPROACH: GOING FAR BEYOND BIOLOGY

As for the ecological approach, in its extended version discussed in this article, it personifies an effective interdisciplinary tool of cognition. After all, ecology can be understood in the narrow and broad senses of the word. In the narrow and

[18] Deleuze, Gilles and Guattari, Félix, *What is Philosophy?* New York: Columbia University Press, 1994.
[19] Deleuze and Guattari, What is Philosophy? P. 186.
[20] Guattari, *The Three Ecologies*, p. 52.

traditional sense of the word, ecology studies the problems of co-evolution of nature and humanity, the problems of preserving natural diversity on our planet, and the protection of wildlife. In the broad sense of this word, we can talk about the ecology of the human mind, ideas, the ecology of cognition and creativity, the ecology of thought and word, the ecology of human action and control over complex systems. The extended ecological approach is one of the most demonstrative examples of how interdisciplinarity actually works in the practice of scientific research and individual and social action.

Ecology of cognition. The ecological approach to cognition (ecology of cognition)[21] means that any cognitive act is considered as situationally conditioned. Any cognitive system is built into environment, cognition is *embedded* both internally – in the material, neuronal substrate that provides its agency and externally – it is included in the external situated physical and socio-cultural environment, in cognitive and social networks. Each cognitive act expands into some situation with certain topological properties. The concept of situated cognition is a part of the conception of embodied and enacted cognition, the beginning of which was laid by F. Varela. [22]

It is impossible to understand a cognition if abstracted from a living organism, which is always included in a certain situation that has its own peculiar configuration, i.e., acts in ecologically defined conditions. Cognitive psychology takes on an ecological dimension, and equally we started to understand that cognitive science reveals synergism of a living organism and its environment, their constructive mutual coupling and ecology of cognition (because any act of cognition is determined by a situation). We can talk about the ecology of a cognizing mind – in a broader sense about the ecology of a cognitive agent, - and about ecological cognitive niches. If, for example, we consider a scientist, only correctly, resonantly embedded if, for example, we consider a scientist, only by correctly, resonantly integrating into his environment, in the scientific community, he can he reveal his talent and realize himself. Otherwise, he will experience the pressure of the place, and namely the pressure from the already filled cognitive niches and will be forced to rearrange himself.

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[21] Winograd, Eugene, Fivush, Robin, Hirst, William (Ed.), *Ecological approaches to cognition: essays in honor of Ulric Neisser*, Mahwah, N.J.: Lawrence Erlbaum Associates, 1999.
[22] Varela, 'Patterns of Life: Intertwining Identity and Cognition'.

There is a connection not only between cognitive science and ecology, but also between psychology and ecology. F. Capra draws attention to this: "The link between ecology and psychology that is established by the concept of the ecological self has recently been explored by several authors. Deep ecologist Joanna Macy writes about 'the greening of the self,' philosopher Warwick Fox has coined the term 'transpersonal ecology', and cultural historian Theodore Roszak the term 'eco-psychology' to express the deep connection between these two fields, which until very recently were completely separate".[23]

Ecology of action. A concept of ecology of action is being developed. The ecological approach is now becoming one of the most fruitful approaches in management theory and decision-making theory. The central point here is the idea of the situational nature of the search and constructive activity of a person. The latter means that it is impossible to understand human activity, including his managerial activity, i.e., his efforts aimed at creating a certain social organization, maintaining its functioning or restructuring this organization, if we abstract from the subject of management as a living organism, which is included in a certain situation that has a peculiar configuration, i.e., operating in environmentally defined conditions. Every act of management expands into a certain situation with certain topological properties; it is carried out *here and now*.

The French thinker Edgar Morin introduced the concept of ecology of action. Uncertainty is immanently inscribed in the very idea of the complexity of the world we live in. Uncertainty means the incompleteness of any process of cognitive and practical activities, unpredictability, openness and nonlinearity of outcomes of these activities. Any action we undertake is determined by certain conditions of the surrounding natural and/or social environment and it may turn out that it deviates from a direction that was originally assigned to it. We cannot be sure that a result of our actions will correspond to our intentions, on the contrary, we have the right to seriously doubt it. Therefore, we are forced to move away from a habitual linear scheme: an action taken → a result obtained, and recognize the nonlinearity of any action, more precisely, the nonlinearity of the relationship between this action and its results (consequences). "As soon as a

[23] Capra, Fritjof, *Hidden Connections: Integrating the Biological, Cognitive, and Social Dimensions of Life into a Science of Sustainability*, New York: Doubleday, 2002.

person begins any action whatsoever, the action starts to escape from his intentions. It enters into a sphere of interactions and is finally grasped by the environment in a way that may be contrary to the initial intention. So, we have to follow the action and try to correct it if it is not too late, or sometimes shoot it down, like NASA exploding a rocket that has veered off course."[24].

To think and act interactively and to exert managerial actions in an adequately developing situation means, therefore, to understand the ambiguity and relative unpredictability of any response received from the environment,[25] from the organization on which the control is exercised, to be aware of the complexity and nonlinearity of the established set of positive and negative feedback, to allow a certain amount of chaos, internal mobility and flexibility in an emerging system of interactive communications, as well as be able to use some rules of resonant embedding into the environment to form a single, steadily evolving whole. Such rules follow from the theory of complex systems.

Ecology of communication. The application of the ecological approach to the phenomenon of communication, and not only in human society, is also possible. In this case, communication is understood in connection with the formation of intersubjectivity. The key principle on which the ecological approach to communication is built is that a living organism (a living being or a human as a cognitive agent) is the center of the world's activity, it is involved in the world bodily, neuronally, perceptually, intellectually, it is embedded in the dynamics of the surrounding world, its environment and transforms this environment in accordance with one's own needs. The ecology of communication is coupled with the active construction of a communicative space. In his activity, a person is built in interactions with other individuals, by them and through them. Intersubjectivity grows at every moment from the interactions of two or more subjects. Some authors propose to understand social cognition, of course, including communication, as "*participatory sensemaking*".[26] In other words,

[24] Morin, *Seven Complex Lessons in Education for the Future*, p. 45.

[25] Apkin, Renat, Tajsin, Emily, 'Ecophilosophy and the problem of monitoring hazards', *Dialogue and Universalism*, vol. 29, no. 3, 2019, pp. 163-170.

[26] De Jaegher, Hanne, Di Paolo, Ezequiel, 'Parpicipatory Sense-making. An Enactive Approach to Social Cognition', *Phenomenology and Cognitive Sciences*, vol. 6, no. 4, 2007, pp. 485-507; Fuchs, Thomas, de Jaegher, Hanne, 'Enactive Intersubjectivity: Participatory Sense-making and Mutual Incorporation', *Phenomenology and Cognitive Sciences*, vol. 8, no. 4, 2009, pp. 465–486.

communication is "the process of generating and transforming meaning in the interplay between interacting individuals and the interaction process itself".[27] Communication and intersubjectivity built on its basis are not just cooperation between interacting individuals and the coordination of their mental activities; it should be considered within the framework of the concepts of non-representationalism, enactivism, corporeity, inbuilding into the world and into each other, and "mutual incorporation" (the term is suggested by Fuchs and de Jaegher). We model the beliefs and intentions of other people we deal with as if we were in their situation. The so-called mirror neurons in the brain are responsible for this process.

The previous conceptual frameworks for understanding communication, in which there are no processual, situational, bodily, interactive and enactive components, are now subject to serious criticism.

Firstly, our mentality is not just an inner kingdom, which is separated from the inner world of others by an epistemic bay, which we can swim across by means of logical conclusions, inferences, projections. We are basically hidden from each other, so in order to understand the other or others, we must put ourselves in his or their place.

Secondly, when evaluating the actions of others and seeking to understand them, we usually take the position of a "third person", that is, an outside observer. This is not enough, we must be built into the situation itself, into the process itself: observation from the outside is not enough, we must be in interaction with each other or even in enacting the others, and such is the position of enactivism.

Thirdly, we should avoid the Cartesian mistake that the body is just a transmission device; on the contrary, it is necessary to consider the mutual connections of body-endowed cognitive agents.

Fourth, traditional approaches to social cognition are insufficient and subject to criticism, since they do not take into account that cognitive and creative abilities derive from each other, are connected in a certain way and evolve throughout human life.

An approach of enactivism is put forward as an alternative one. Fuchs and de

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[27] Fuchs, de Jaegher, 'Enactive Intersubjectivity: Participatory Sense-making and Mutual Incorporation', p. 466.

Jaegher reveal the essence of their approach as follows:[28]

> 1. Social understanding, albeit interactive, i.e., based on interactions between people, is an individual matter of each of us. It is built from and thanks to the autonomy and peculiar identity of each of us.
>
> 2. Communication is essentially based on embodiment in the most profound sense of the term, i.e., on the dynamic actions that are produced by integral and bodily-endowed and in a certain way bodily organized and bodily determined individuals.
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> 3. The intentions of individuals are not opaque and hidden, they are expressed in their actions, therefore they can be perceived and understood by others.
>
> 4. The goals and intentions of other people are not pre-given and static, they are generated and transformed in the process of interaction and depending on changing social situations. Social cognition and social action mean the possibility of self-correction of one's actions depending on the reactions of others and depending on the changing situation and circumstances of social interaction.

Hence the following conclusion is drawn: "We conceive of social understanding as an interactional and intercorporal process in which both partners are immersed and in which the process of interacting itself plays a leading role for the understanding … Social cognition emerges from embodied social interaction or, in Merleau-Ponty's term, from intercorporality. In elaborating this concept, we will describe it first from an enactive approach, namely as a *dynamical coupling and coordination of embodied agents*".[29]

The production of meanings (or sensemaking) is not a one-time act, but a process. The meanings are co-created in the process of interaction between partners; more and more new meanings are revealed as this interaction unfolds and deepens. The production of meanings in social interaction is an open-ended process, a real adventure that is fueled by the synergy of interacting individuals.

In the process of communication, we give meanings to things. Since communication is an active process, meanings can not only be used, but also controlled or subject to change. Communication is like a dance in which people are in a shared space, the transfer of information is accompanied by the transfer of emotional states (surprise, compassion, interest, despair, disappointment, etc.).

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[28] Fuchs, de Jaegher, 'Enactive Intersubjectivity: Participatory Sense-making and Mutual Incorporation', p. 469-470.

[29] Fuchs, de Jaegher, 'Enactive Intersubjectivity: Participatory Sense-making and Mutual Incorporation', p. 470.

The dynamics of communication is complex and volatile. Violation of interpersonal symmetry can lead to abrupt changes such as phase transitions.

Ecosemiotics. Reality is filled with signs for living beings, both for plants and animals, and for humans. The ecological approach is fruitfully developing in semiotics, and this area is called ecosemiotics. The Moscow-Tartu school of semiotics has made a significant contribution to the development of this scientific direction. The subject of ecosemiotics is the study of "the role of environmental perception and conceptual categorization in the design, construction, and transformation of environmental structures".[30] Ecosemiotics has two different planes, biological and cultural.

Let me note several problem areas where the contribution of ecosemiotics is of great significance. Firstly, its close relationship with enactivism. As a matter of fact, this is a different expression of the active connection of an actor of cognition, action, communication with the environment. Recognizing signals as signs, a living creature influences the environment, designs it, constructs it, but there is also an inverse influence of the environment on it, it is built by the environment. In fact, this is one of the eight key principles of ecosemiotics that Maran and Kull emphasize. "Changing signs can change the existing order of things. Living organisms change their environment on the basis of their own images of that environment".[31] I can only add that this influence is mutual. By changing the environment, a living being changes itself. Secondly, any sign ecosystem is an open structured system that has translucent boundaries with the environment. The boundaries at the same time connect the system with the environment and separate it from the environment, i.e., the system is operationally closed. Borders allow to preserve the integrity and internal diversity of the ecosystem, its identity, and its openness allows to transform the system, using the potential of its internal diversity and the fluidity of external situations and circumstances. Thirdly, the concept of landscape is introduced in ecosemiotics.[32] Any landscape has a dynamic character, spatial and temporal characteristics in it are linked together.

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[30] Maran, Timo, Kull, Kalevi, 'Ecosemiotics: main principles and current developments', *Geografiska Annaler: Series B, Human Geography*, vol. 96, no. 1, 2014, pp. 41.

[31] Maran, Kull, 'Ecosemiotics: main principles and current developments', p. 44.

[32] Lindström, Kati; Kull, Kalevi; Palang, Hannes. 'Landscape semiotics: Contribution to culture theory', in: Lang, Valter; Kull, Kalevi (Ed.). *Estonian Approaches to Culture Theory*. Tartu: University of Tartu Press, 2014, pp. 110-132.

In spatial configurations, you can see the history of the ecosystem, and time can be represented in spatial features. Fourthly, ecosemiotics promotes holism. It emphasizes the inseparability of living and nonliving in nature, natural and artificial, natural and human, biological and cultural. Plants, animals, and even individual cells - everything is involved in semiosis - the process of converting physical signals into conventional signs, and in the human world also into symbols.

Ecology of management. Central to the development of an extended ecological approach to management is the idea of the *situational nature* of a person's search, constructive, and entrepreneurial activity. The latter means that it is impossible to understand managerial activity, i.e., one's efforts aimed at creating a social organization, maintaining its functioning or restructuring this organization, if we abstract from a subject of management, operating in environmentally defined conditions.

The relationship of a subject of management to his environment is essential, nonlinear feedbacks are established between them. So, the head of an enterprise influences his employees, determines the structure of a corresponding institution, the distribution of functions and responsibilities between departments and individual employees, influences the general climate that is developing in the institution, but at the same time he himself constantly changes, grows together with his institution. A good leader with the accumulation of management experience learns to provide unobtrusive, but appropriate, awakening influences on his employees, stimulating them to creativity, self-realization, and the disclosure of their hidden inner potential. A constructive and interactive relationship is established between him and his subordinates.

In this case, there is a *synergy between a governing subject and the environment*, the organization in which he acts, their constructive mutual connection and mutual coming into being in the process of activity. Synergy – in the literal sense of the word, a concerted action of energies of a manager and his subordinates, co-vigor – is possible only in the sphere of their personal being-communication. A subject of management is in a certain way integrated into the environment, into the social organization, constructs its own *ecological niche*. Both he and the environment (organization) are active. On the one hand, the subject of management acts in accordance with certain established patterns of behavior that direct and make his

managerial actions selective. On the other hand, the environment itself, the controlled objects and subordinated persons themselves *afford opportunities* that can be perceived and realized by the subject of management or left without attention, fall out of the scope of his efforts.

The world of complex social systems is an ocean of potentials, a seething of various possibilities. According to M. Merleau-Ponty, "the flesh of the world is a storehouse of possibilities" (in original: "Le chair du monde … est prégnance de possibles, Weltmöglichkeit").[33] The vector of a subject's managerial action is directed every time only at one of the opportunities provided by the world, it is exceptionally selective, built in accordance with the subject's attitudes and the opportunities afforded to him *here and now*. In other words, the subject of control and the environment to which his managerial action is directed are linked through mutual and situational affordance of opportunities, which is a genuine interactivity and synergy of the act of management.

Thus, the theory of social management becomes ecological because the managerial actions are determined by some situation and must be built into proper environment in a certain way. To think and act interactively and to exert managerial actions adequately to a developing situation means, therefore, to understand the ambiguity and relative unpredictability of a response received from the environment, from the organization on which the control is exercised, to be aware of the complexity and nonlinearity of the established feedbacks, to allow a certain part of chaos, internal mobility and flexibility in the emerging system of interactive communications, as well as be able to use the rules of resonant embedding into the environment to form a single, steadily evolving whole.

To effectively manage the processes in the modern and globalized world, to properly embed a person in co-evolution, it is necessary to learn to think globally and to act actively and interactively, adequately to a certain situation, to be in synergy with the environment, with a managed organization or enterprise, to create a coherent, mutually concordant world which conforms to both a manager's own cognitive and constructive possibilities and internal implicit

[33] Merleau-Ponty, Maurice, *Le Visible et l'Invisible*, Paris : Gallimard, 1964, p. 304.

tendencies of the environment under his control.[34] The constructive and creative position of a modern manager is intended to be determined by a possibility of deliberate resonant excitation of complex structures in the corresponding nonlinear environments and systems, those structures that correspond to stable forms of organization of these environments.

Ecological approach in pedagogy. Within the frameworks of the extended ecological approach, the teaching and pedagogical procedure, the way of communication between a teacher and a student appears as their mutual cyclical determination and their mutual construction, coming into being and development.[35] Education is not a transfer of knowledge as a relay baton from one person to another, but the creation of conditions under which the processes of generating knowledge by a student himself and his active and productive creative activity become possible. This is a non-linear situation of open dialogue regulated by loops of positive and negative feedback, a solidaristic educational adventure, falling into the same self-consistent tempo world as a result of resolving problem situations during a lesson. The latter means that thanks to the joint activity in such a situation, the teacher and the student begin to function at the same speed, to live at the same pace. The teacher does not just ask questions to which he knows the answer in advance, although this is the case in the initial stages of learning. He poses problems in such a way as to start joint research, so that his student is surprised at the mysteries of being, understands the inexhaustibility of knowledge about the world, and acquires not so much "know what" as "know how".

Learning becomes interactive. Not only a teacher educates a student, but the student also educates the teacher, they become collaborators cooperating with each other, they are in a synergistic bond. The teacher must learn to see what is hidden behind a certain student and learn to understand him. In the process of learning, an ignorant student turns into a knowledgeable one, and at the same time a teacher himself changes, just as in the process of psychotherapy a patient turns into a healthy man, or at least a convalescent one, but at the same time a

[34] Steverson, B.K. Systems Theory and the New Ecophilosophy, in *The Environment: Philosophy, Science, and Ethics*, Cambridge (MA): The MIT Press, 2012, pp. 73-87.

[35] Hecht, Marijke, Knutson, Karen, Crowley, Kevin, 'Becoming a Naturalist: Interest Development Across the Learning Ecology', *Science Education*, vol. 103, no. 3, 2019, pp. 691-713.

doctor himself undergoes changes, experiencing his mental equilibrium and in in most cases, strengthening it.

Learning is not a transfer of knowledge, but an awakening of the human soul. The disciple is not a vessel to be filled with knowledge, but a torch to be lit. And this is precisely the talent of a teacher. The main problem is how to exert managerial influences without managing, how to push a system onto one of its own and favorable paths of development, how to ensure self-governing and self-sustained development by a small resonant impact. The problem is also how to overcome chaos (unorganized and spontaneous aspirations of a student), not overcoming it, but making it attractive, creative, turning it into a field that gives rise to sparks of innovations. The extended ecological approach to education is about stimulating, or awakening, education, education as an opening of oneself or cooperation with oneself and with other people. The extended ecological approach to education is about stimulating, or awakening, education, education as an opening of oneself or cooperation with oneself and with other people.

From an ecological point of view there seem to be certain configurations of situations of cognition, learning, or life. To act most effectively, you need to act at the right time and in the right place. We are talking about the so-called resonant, topologically correctly organized and timely impacts, impacts *here and now*. Their results can be quite unexpected and promising.

In the process of educating and developing a student's creative abilities, nonlinear feedbacks are established not only between him and his teacher, between him and the world around him, but also within his own spiritual and mental world. It is paradoxical that the waste of spirit energy spurs its growth, the exhaustion of your soul to the end in the process of writing a work is a guarantee that tomorrow you will have something to say to the world and that new paths to the future will open.

The article attempted to show that in a number of disciplinary areas adjacent to biology and more distant from it - in philosophy of mind, communication theory, management theory, theory and practices of education - the ecological approach turns out to be heuristic; on its basis, some interesting conceptual ideas appear, new opportunities for discussing complex problems of human interaction with the environment and of sensemaking in the human world and in the natural world as a whole can be found. This kind of interdisciplinary search is not easy,

but the method of transverse (through and cross) analysis proposed by Félix Guattari together with his concept of ecosophy can be really useful and stimulating here.

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