


## The connection (everything is interconnected) between being and knowing in Gregory Bateson: Epistemological contributions to the environmental sciences

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Felipe Vieira da Cunha Neto<sup>1</sup>, Luis Felipe Magalhães de Menezes<sup>2</sup> and Aumeri Carlos Bampi<sup>3</sup>

### ABSTRACT

Gregory Bateson is the author of a vast body of work, elaborating a series of concepts, reflections and deep and inspiring interdisciplinary approaches to a systemic way of knowing the world. Bateson dedicated himself to an interdisciplinary posture in his work, seeking to identify principles and elaborate concepts that could encompass different areas of knowledge and levels of existence. However, the fact is that Gregory Bateson's work is still not widespread in the Brazilian academic environment. Thus, the objective of this study is to present some fundamental concepts present in his writings, their influence on different areas of knowledge and his integrative perspective of mind and environment, Nature and culture. Bateson contributed to Anthropology, changing paradigms and integrating the cultural and biological aspects, traditionally seen through a disciplinary prism. He also contributed to the development of Cybernetics, Psychology and Psychiatry. One of Bateson's main concepts is that of the *ecology of the mind* and the *pattern that connects* all things.

**Keywords:** Ecological epistemology, Ecology of the mind, Pattern that binds.

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<sup>1</sup> Degree in Forest Engineering and a master's degree in Environmental and Forest Sciences from UFRRJ. He is an EBTT professor of the Forest Engineering course at IFMT - Cáceres Campus. PhD student in the Graduate Program in Environmental Sciences at UNEMAT.

<sup>2</sup> Forest Engineer, Master in Environmental Sciences from UNEMAT.

<sup>3</sup> Phd in Philosophy and Educational Sciences from the University of Santiago de Compostela - USC, Galicia, Spain. He has a postdoctoral degree in Social Psychology from the University of São Paulo (USP). Professor at the Faculty of Human Sciences and Language and the Graduate Programs in Environmental Sciences (PPGCA) and Geography (PPGGEO) at the State University of Mato Grosso (UNEMAT).



## INTRODUCTION

This study is the result of a provocation to reflection and writing with the Graduate Program in Environmental Sciences in the moments of study of Environmental Epistemology. We explain this situation with the didactic purpose and the intention of contextualizing the components of the system such as the authors, the moment of this philosophical study, the institution with its professors and researchers and with its curricular propositions, thus expressing ideas that are in tune with what Gregory Bateson proposed that everything is interconnected.

In this sense, one of Bateson's main ideas is that the relationships between living beings take place in a *context*, where the flow of information occurs and where learning takes place (the system and the parts of the system exist, are and learn). It is in the context in which events are endowed with meanings (Bateson, 1986).

However, this production was not written to meet a specifically disciplinary demand, but proposes to highlight the importance of Bateson for current ecological and environmental reflections, always proposing the interdisciplinary character of analysis and construction of knowledge going beyond the disciplinary walls so strong in the world of modern science.

Gregory Bateson is the author of a vast body of work, elaborating a series of concepts, reflections and deep and useful interdisciplinary approaches for various areas of knowledge. To be more fair to his work, we must say that it has enormous relevance to merge, relate and connect (reconnect) the disciplined and fragmented knowledge present in universities, books and academic research. In addition, it proposes another look at the world and life. Scholars of Bateson and his analyzed work corroborate this understanding.

Bateson dedicated himself to an interdisciplinary posture in his work, seeking to identify principles and elaborate concepts, beyond the closed world of disciplines, which could encompass different areas of knowledge and levels of existence. The fact is that, even building great advances in analysis and leaving a relevant legacy, the work of Gregory Bateson is still little known in the Brazilian academic environment.

In this way, the objective is to present some main concepts present in Bateson, his influence on different areas of knowledge and his integrative perspective of mind and environment that can be updated in academia and in the diverse knowledge of society. In this way, it also seeks to contribute to the dissemination of this important legacy of Bateson.

## SHORT BIOGRAPHY

The biographical information comes from Centeno (2009). Bateson's father, William Bateson, was a scholar of genetics and was interested in the effects of the environment on species variations. Gregory Bateson was born in Grantchester, a village near Cambridge, England, on May 9, 1904. The



name Gregory Bateson was a tribute to Gregor Mendel. In 1924 he came to work with his father, at his invitation. On the island of Chatham, New Zealand, on his way to a scientific expedition to the Galapagos Islands, Bateson has contact with indigenous people and meets and observes them for the first time. On another stop on the trip, he joined ornithologists, but zoology was not his priority field at that time. Humans and the relationship with the environment seemed to him to be an object of greater interest to study.

A.C. Haddon, an English anthropologist and ethnologist in Cambridge, was interested in the observations that Bateson had made about the natives. He then asked Bateson to present a paper on the subject. Bateson began to study anthropology. He envisioned clarifying the relationship between the Natural Sciences and the Human Sciences. His knowledge of the natural sciences contributed to the study of cultural differences. Around 1932 he became involved with studies related to Psychology, Psychoanalysis and Learning Theories.

Gregory Bateson married Margaret Mead in 1936 and they had a daughter, Mary Catherine Bateson, who also became a renowned anthropologist and writer. In 1939, Bateson moved to the United States. Some time later he became a naturalized American. Between 1942 and 1948, Bateson delved into the studies of Psychiatry and also became increasingly interested in the development of Cybernetics and Information Theory. In 1948 he was invited to participate in a study on Communication and Psychiatry.

Gregory and Mead divorced in 1950, but the period of their union was intellectually fruitful, as both were influential in the field of anthropology and contributed to the development of studies on culture and human behavior. They have collaborated on a number of researches, including the study of cultures in New Guinea.

Bateson had two other daughters, Nora Bateson (born 1969), daughter of Gregory Bateson by his third wife, Lois Cammack. Nora Bateson has served as a filmmaker, writer, and educator, involved with the continuation of her father's work in cybernetics and ecology. She directs the *International Bateson Institute* in Sweden and works on systems concepts and complexity. Gregory Bateson also had a third daughter with Lois Cammack, Laura Bateson.

Between 1952 and 1954 Bateson developed a study of animals at the San Francisco Zoo, California, involving communication between them. Later on, Bateson would become involved in studies involving aspects of communication and schizophrenia. The hypothesis resulting from these studies was presented in 1956, generating a great impact in the field of Psychiatry, as the disease was seen, innovatively, from an interactive and systemic perspective.

Subsequently, Bateson leaves the research group and continues his work towards the identification of the fundamental principles of communication in general. In 1965, Bateson developed a study related to animal communication.



In 1972, Bateson released the work *Steps to an Ecology of Mind*. The work resulted in invitations to several lectures throughout the United States. In 1979, the book *Mind and Nature: a Necessary Unity* was released. The works synthesize the ideas of his work developed throughout his life. Bateson died in 1980.

## **AN INTER/TRANSDISCIPLINARY WORK: CONTRIBUTIONS TO AN INTEGRAL VISION OF HUMAN KNOWLEDGE AND THE RELATIONSHIP WITH THE WORLD OF LIFE**

Bateson produced a work that permeates different areas of knowledge. In fact, his work can be characterized not only as interdisciplinary, but transdisciplinary. Bateson's thought contributed and can still contribute a lot to the different areas of knowledge, or to knowledge in general. Being more Batesian in our statement, because for the thinker there seemed to be no boundaries or disciplines, only knowledge, or perhaps we could affirm, the world and knowledge about it, as a metaphor.

Regarding Anthropology, Velho (2001) reports the problem of the scientific nature of the Social Sciences. At the end of the nineteenth century, Dilthey and, later, Weber, "solved" this problem, distinguishing the "sciences of the spirit" from the "sciences of nature". However, according to the author, such a solution was framed in the opposition between Nature and culture, further distancing these fields as distinct. The author also reports a historical process, of an interpretationist stance of the Social Sciences, against imperialism arising from the natural sciences, permeated by reductionism.

Thus, the Social Sciences have adopted a defensive posture, influencing very little in contemporary scientific debates because they close in on themselves. Also according to Harries-Jones (1995), Gregory Bateson adopted a different posture from the one exposed, more proactive, with the search for a paradigm shift.

Currently his writings arouse interest in anthropologists, who had suffered a rupture between their sociocultural and biological aspects. Bateson tries to integrate these two aspects. For Velho (2001), a recent sign towards an interdisciplinary "ecological paradigm" related to Anthropology was the launch of the book *The Perception of the Environment* (Ingold, 2000), taking up many of Bateson's questions. Despite the differences, the work was heavily influenced by Bateson's ideas.

Chiesa (2017) shows the importance of Bateson in the development of *Cybernetics*. According to the author, the *Macy's Conferences* were a series of interdisciplinary meetings held between 1946 and 1953, promoted by the Josiah Macy Jr. Foundation, in the United States. Organized by mathematicians and neurologists, the conferences brought together a diverse group of scientists, including biologists, psychologists, engineers, mathematicians, anthropologists, among others, to discuss cybernetics and topics related to communication and control of biological and



mechanical systems. The conferences were held in various locations in the United States, but those held in New York and on the East Coast stand out.

The central objectives were: 1. The creation of a unified theory about complex systems, both natural and artificial, proposing to establish the foundations of a new general science about the human mind; 2. Studies on feedback, homeostasis and communication in different types of systems; 3. The exploration of concepts such as automation, artificial intelligence (AI) and the relationship between machines and living beings. 4. The investigation of the social and ethical implications of the technological advances of the nineteenth and twentieth centuries.

Chiesa (2017) reports that the set of events resulted in the emergence of Cybernetics or "science of regulation and communication in the animal and in the machine", with Bateson as one of its influencers.

Quoting Capra (1996), Chiesa (2017) points out that it caught Bateson's attention:

... the centrality of the conceptions of *feedback*, *self-regulation* and *self-organization* for the full understanding of the dynamics of life. The key idea that there is a *general pattern* of organization of life – applicable both to organisms and to social configurations, which is connected and perpetuated in different layers of reality – also seems to have enthused him, as well as the eminently interdisciplinary character of those propositions (p. 411).

Later, cyberneticists themselves criticized the theory, due to the comparison that was made between the functioning of the human brain and computers, as they are different structures. But the interdisciplinary principle and the systemic interpretation of Cybernetics remain, and it evolves into a broader view.

This look at the connections, interactions and transformations, at the system in its totality, at the *pattern that connects*, would help, in Bateson's view, to produce a more interesting understanding of the environment, the mind and life itself. Thus, based on cybernetic principles, he will try to overcome certain long-established worldviews (and divisions) and propose another reading, another *epistemology*, another way of seeing, of doing science and of relating to ourselves and to everything that surrounds us. A science of relationships, paths, movements, improvisations, processes, which helps us to see and think about the world in a different way, less dichotomous, more fluid, or, if we want, less binary, more chromatic (Chiesa, 2017, p. 413) (emphasis added).

In fact, Cybernetics influences the systemic way in which one seeks to see the environmental problem today, as we can see in the work of Krüger (2001). In a systemic approach to the environmental problem, the author makes reference to Cybernetics using its principles to highlight the complexity, interdependence and self-regulating nature of environmental systems, while also pointing out how human action is interfering too much in these vital mechanisms, not allowing self-regulation, which results in the environmental crisis.

Now, the environmental problem is not only a multi-faceted approach, but also an inter- and transdisciplinary one, as it is multifactorial and multidimensional, which is a characteristic of



Environmental Sciences, which was consolidated as an area of knowledge in Brazil in 2011, according to Capes (2019), "*based on the need to address environmental challenges, considering the interaction between anthropic and natural systems*". This interdisciplinary approach is related to Bateson, as it is influenced by Cybernetics and systems thinking.

An interdisciplinary scientific approach requires the development of appropriate language. Brügger (2006) points out that Western knowledge, the modern science of instrumental reason, is based on disciplinarity. Thus, as the basis is the monodiscipline as a foundation, for the development of interdisciplinarity to happen, language must be reviewed, as it reflects a dichotomous "structure of thought", based on disciplinary oppositions and fragments of knowledge that do not encompass the totality. "Words do nothing but translate a thought." Thus, "*our language is inadequate*" for an interdisciplinary knowledge construction, because "All theoretical knowledge starts from a world already shaped by language" according to Cassirer (1992) *apud* Brügger (2006).

Also in the considerations of Brügger (2006) it is possible to perceive the influence of the systemic thinking introduced by Cybernetics, with regard to the concept of feedback, which was influenced by Bateson, as already reported, when the author mentions that "language and thought (and culture) feed each other".

In addition to Cybernetics and Anthropology, Bateson also exerted influence on Communication Theory. According to Lana (2008), the orchestral communication model came from Cybernetics and systems theory. According to the author, one of Bateson's contributions is the concept of *double bind*, developed in conjunction with other researchers. According to Winkin (1998), the double embarrassment consists in "seeing the origin of childhood schizophrenia in a network of contradictory relationships between mother and child".

The theory, related to schizophrenia, postulates that the symptoms of the disease would be an expression of the anguish caused by situations of double embarrassment, which refers to a paradox in communication" (LANA, 2008, p. 238).

However, we perceive the inter and transdisciplinary character of Bateson when Lana (2008) cites Winkin (1998), stating that Bateson does not limit his work to Psychiatry. Lana (2008) highlights Winkin's (1998) statement:

While his colleagues continue their work within Psychiatry, Bateson resumes his vast interrogation about communication. He returns to animal communication, which had fascinated him so much when he discovered the game between otters. He is interested in the modes of interaction between octopuses, and then between dolphins (WINKIN, 1998, p. 50-51).



We see here, therefore, a search for a general theory of communication, based on diverse data, derived from observations of schizophrenic behaviors, games between otters and dialogues between a ventriloquist and his dummy (Winkin, 1998).

It can be seen that Bateson did not have a gaze focused on a single aspect of life, on a single object, but sought a broader vision, a vision of the whole, in search of patterns, or the *pattern of patterns*, of what would connect all things, of the relationships, of the connections between living beings mainly, but also between living and non-living beings. That would be the *pattern that binds*.

Bateson's influence on psychology is also reported. Carvalho and Steil (2013), commenting on Bateson's focus on the search for understanding relationships, mentions that Lewin makes perception paramount for Social Psychology in the understanding of the reciprocal relationships between the person, behavior and the environment from its deepening in the notions of Ecological Psychology, vital space and psychological field, making an interaction with Bateson's thoughts.

It is discussed by Carvalho and Steil (2013) that the forms of interactions that Bateson questions have positively influenced the area of Psychology with their contributions to Environmental Psychology. The same authors also report on Gibson's position in relation to Environmental Psychology being direct and that the information is not in the mind of the perceiver but in the environment and the discussion of the direct relationship between the perceptive subject and the environment, leaving aside the processing of sensory stimuli.

Bateson's contribution to the emergence of a look, of a thought that is more integrated with things, with the world, with phenomena, with the environment, with life itself, can be observed in Steil and Carvalho (2014), who propose the term *ecological epistemologies*, rereading several contemporary authors from this "interpretative key". This group of authors, cited by Steil and Carvalho (2014), such as Haraway (2003), Latour (2004), Stengers (2002), Leff (2006) and Gibson (1979), are situated in a "heterogeneous field of *ecological epistemologies*" by identifying their convergences and continuities (despite the differences between them).

The term ecological epistemologies as we propose it delimits a region of the contemporary theoretical-philosophical debate, which comprises authors from disciplinary backgrounds and different theoretical options, whose common point is the effort to overcome modern dualities, such as nature and culture, subject and society, body and mind, artifice and nature, subject and object (STEIL; CARVALHO, 2014, p. 164).

In this analysis, it is also possible to observe Bateson's influence. Steil and Carvalho (2014) point out that the term ecology was already mentioned by Gregory Bateson between 1960 and 1970, in his work in the areas of Anthropology and Psychology. Citing Bateson (2000), the authors also point out that, through the concept of *ecology of mind*, Bateson pointed "to the continuities that exist not only between nature and culture, but also between mind and environment".



For Steil and Carvalho (2014), Bateson criticizes "the externality of the observer in relation to the researched object and of the mind in relation to the environment", as a criterion used to validate knowledge, the old Cartesian practice fed by the positivism of the knowing subject dissociated from the object to be studied. This puts Bateson's thought in coincidence with other thinkers with regard to the criticism "of the researcher's externality in relation to what he observes in the investigation process".

Regarding the ecology of the mind, Marques (2012), citing Canevacci (2001), points out that this concept demonstrates an attempt to radically overcome the archaic dualisms of matter and spirit, proposing the fusion between Nature and culture.

Thus, he supports the thesis that "the mind rightfully belongs not only to the human being, but also to each immanent unit in the great biological system: the ecosystem." This translates into what Bateson calls "the pattern that connects". (MARQUES, 2012, p. 18)

## LEARNING TO LEARN AND CONNECTING THINGS: FATHER-TO-DAUGHTER TEACHINGS FOR A THINKING POSTURE

*Learning to learn* is a learning of contexts (Bateson, 1993 *apud* Martins, 2002). One of the ideas, among many, present in Gregory Bateson, is to learn how to learn. And in this way, or in this spirit, he apparently developed his work and himself.

His daughter, Nora Bateson, reports this relationship in the education she received from her father and also observed this posture (mentality) in the daily behavior of Gregory Bateson. The concept of *systems thinking* also comes from Bateson. However, it is interesting to note what Nora Bateson reports in an interview with Demarchi et. al., in 2013, making a severe criticism of disciplinary thinking:

First of all, it is important to recognize that there was no such thing, a systems thinking. There was no systemic way of looking. You have to remember that this was before these words were even used, that is, pre-cybernetics, pre-systems thinking, pre-complexity, pre-chaos, before all these thoughts. In this context, there was no field of thought in which he could apply these concepts. He created the rules as he went along. He was really venturing into conceptual territory. In his academic career, I can only say that he used the tools of academia to serve the purposes of his research: to put the puzzle of the world back together. He did not serve the academy. He has never held a position for more than ten years in any place where he taught. He never wrote a dissertation. He thought that disciplines and the separation of disciplines were something monstrously brutal, for the whole notion of how life works and how things are organized, whether it was a family, or a lake, or a political system, or a forest, or a cultural structure. The disciplines are built to be separate. If you ask a university to build a jungle, you'll end up with a reptile department, (laughs) a bird department, a tree department, and a water department. I think that this is a really good example, because this forest would not work in a dynamic and integrated way. However, there is real value in studying the parties. We have to study the parts. There's no doubt that in our body's system, we don't want the heart to do the work of the lungs, right? We don't want reptiles to be birds in our forests. We want each of them to be themselves. So, there are these individual roles, of the parties, which are very important for the integration and interdependence of the whole system. They are not important in and of themselves, separately. So what we do with our scientific method is we take things out of their contexts, but we never put them back. Therefore, in terms of relations between the disciplines, we have





a long way to go, perhaps not so long, but undoubtedly a radical step to be taken. Because just thinking about this, about what it means to look at our whole complex system, the first thing we do is separate another category of systems thinking, as if it were something different. I have always been concerned about why Ecology is separate from Family Therapy and Economics? Why is it in a separate field of study? It shouldn't be. It should be the Ecology of Family Therapy, the Ecology of Communication, the Ecology of the Economy, the Ecology of..., right? However, somehow this has also become a different discipline and systems have the ability to do this as well. It's like a trap. We should really be careful not to fall into the seductive idea that this is something different. (DEMARCHI et al., 2013, p. 280) (emphasis added).

For Gregory, this did not exist. There was nothing of *systems thinking* or *systemic theory*. It never existed. It was just what it was. It is very difficult to perceive this at this moment in history, in the present. ... we thought: *well, Bateson was using systems thinking*. No. Bateson was just being Bateson. Systems thinking was the name we ended up giving to this activity, later in time" (DEMARCHI et al., 2013, p. 280).

Although Centeno (2009) states that Bateson wrote his dissertation in 1935 (the work *Naven*) and in 1936 published his thesis, unlike Demarchi et al. (2013) report that Bateson never wrote a thesis. He received the title of Doctor *Honoris Causa* from the academy. In fact, in the words of Nora Bateson, Gregory Bateson "thought it was an absolute waste to try to get a PhD! He thought the best thing to do was simply to pursue what interested him." Gregory Bateson was also not limited to the knowledge disciplined in the universities.

Also according to the authors Demarchi et. at (2013), Nora Bateson comments that Gregory Bateson:

... He worried about what was being broken, disconnected. What worried him was a very delicate interdependence and the delicate relationships that created them. (Demarchi et al., 2013, p. 280).

This concern with the relationship, connection or interdependence between things can be perceived in the following sentence by Bateson:

You've probably been taught that you have five fingers. This is totally incorrect. This is the way in which language subdivides things into things. The biological truth is probably that in the growth of this thing in your embryology, which you barely remember, what was important was not the five, but the four relationships between pairs of fingers (DEMARCHI et. al, 2013, p. 275).

Not only the concern with the connections and relationships between things (parts of one or the system), but the concern with the mind, with the way people think and that results in the rupture of such relationships, was also the object of deep concern for Bateson, according to his statements in the film *An Ecology of Mind* (Bateson, 2011):

What is it about our way of perceiving that makes us miss the delicate interdependencies in an ecological system that give it its integrity? We don't see them, and for that reason we break them. (emphasis added).  
The main problems in the world are the result of differences between how Nature works and the way people think. (emphasis added).



## THE PATTERN THAT BINDS: HISTORY, CONTEXT, AND MEANING

From here, we focus on some ideas and concepts present in Bateson, specifically from his book *Mind and Nature: The Necessary Unity* (1986).

According to Barbosa (2011), Bateson appropriates Jung's concepts of *pleroma* and *creatura*, from the work *Septem Sermones ad Mortuos* (Seven Exhortations to the Dead). According to Bateson (1986), Jung presents two worlds, called *creatura* (the living) and *pleroma* (the non-living, the world of "things"). Bateson makes this "separation" between non-living "things" (*pleroma*) and living things (*creatura*) in his book *Mind and Nature: The Necessary Unity* (1986) and states that the content of this work is about living things and that, throughout his life, he had left the *pleroma* "in peace". Regarding this apparent separation, Centeno (2009) observes that:

The observation that the Pleroma and the Creatura form two distinct worlds could lead us to think that Bateson defended Cartesian dualism. However, the unifying perspective of the world is safeguarded when it affirms the interrelation of the determinisms resulting from each world. ... The two worlds are separable simply as levels of description (Centeno, 2009, p. 3).

In this sense, according to Centeno (2009, p. 3)

Cartesian dualism introduced a break between the ability to apprehend the mental process and the attitude to reflect on the natural world. The rejection of the Cartesian position oriented Bateson in the direction of a monistic perspective of reality and to consider spirit and matter as an inseparably united whole. The environment is inside us and not outside us. The others are part of us, we are the ones who transport them.

From the above, Bateson asks, "What is the *standard that binds* all living things?" Bateson sought to understand what he called the pattern that binds. This concept, present in his work *Mind and Nature: the necessary unity* (Bateson, 1986), is initially presented from morphological observations of a crab. In the initial demonstration of the presence of patterns, Bateson notes the following:

The anatomy of the crab is repetitive and rhythmic. Like music, it is repetitive with modulation. In fact, the path from the head towards the tail corresponds to a sequence in time: in embryology, the head is older than the tail. A flow of information is possible, from front to back (p. 94).

Being more specific, Bateson (1986) reports that:

The parts of a crab are linked by various patterns of bilateral symmetry, serial homology, and so on. Let's call these *internal* patterns of individual crab development *first-order connections*. Let's now look at a crab and a lobster, and again we find a link by default. Let's call this a *second-order connection*, or phylogenetic homology (p. 93).

Thus, it is observed that, starting from macroscopic anatomy, Bateson (1986) seeks to detail the levels of connections existing in the world. Three levels of connections are presented: first,



second, and third order. *First-order connections* are inherent in the (pattern) relationships between the parts that make up an individual (a crab or a lobster, for example). On the other hand, relationships (similar to relationships between the parts of the same individual) between two distinct individuals (between a crab and a lobster) are *second-order connections*. *Third-order connections* arise from the comparison between crab and lobsters and the comparison between horse and rider, for example.

From this exposition, Bateson (1986) exposes his concept of the pattern that connects: "The *pattern that connects is a metapattern*. It is a pattern of patterns. It is that *meta-pattern* that defines the vast generalization, which, by the way, are *patterns that connect*."

At this point in the study, we return to the issue of *context* and *meaning*, which we began to address in the introduction, as a didactic presentation proposal.

The idea of *history, context and meaning* presented by Bateson (1986) helps us to better understand what the connecting pattern is. "A story is a small group or complex of this kind of connection that we call *belonging*." To exemplify, Bateson assumes that "any A is pertinent to any B if A and B are both parts or components of the same *story*". Bateson says that we think in terms of stories and that this would not isolate the human being "as something separate from the stars and sea anemones, the coconut trees" or any other living being. In fact, since the whole world is connected, "*thinking in terms of stories* must be shared by all minds or minds, whether ours or those of the redwood forests and sea anemones."

In this way, context and pertinence are characteristic of the "behaviors (those stories projected in *action*)" and also of the "internal stories, the sequences of formation of the sea anemone. Its embryology must be somehow made of the same material as the stories", as well as the evolutionary process itself, prior to the embryology of the anemone and all other living beings. This brings us to the idea of *context* and the *pattern that connects through time* (BATESON, 1986).

Continuing his exemplification, Bateson (1986) exposes that when a person goes to a psychoanalyst, he creates a *context*. It presents "stories built inside" the being. "The patterns and sequences of childhood experience are built within" the person. The learning took place in the "experimental sequence of what those *important others*", aunt, father and mother, did. In this context, for the psychoanalyst, the father may be an anti-father, because things only have meaning in some context. In this way:

Or *context* is linked to another undefined notion called *meaning*." Without context, words and actions have no meaning. This is true not only of human communication through words, but also of all kinds of communication, of every mental process, of every mind, including the one that tells the sea anemone how to grow and the amoeba what to do and what to do (p.



## FINAL CONSIDERATIONS

When starting to read by and about Gregory Bateson, depending on the starting point, the reader may initially have the impression that he is reading about ecology pure and simple. Then he sees himself in the world of Cybernetics. Advancing in the reading, the reader realizes that it is about Psychiatry. Then he finds himself immersed in the context of Anthropology, Biology, and the Theory of Communication. During this journey, he sees himself provoked, curious, instigated, questioning and questioned.

One can see, then, thinking about thought, when one comes across Gregory Bateson dealing with human thought and the divergence between the human way of thinking and the way Nature works. The work, or thought, of Gregory Bateson is not restricted to certain areas of knowledge or to some disciplines. Bateson proposes to understand issues that apply to the whole of life, to universal principles and not just optional and punctual.

Bateson's influence is diffuse. Bateson had a hand in the development of Cybernetics. This is perhaps one of Bateson's great contributions and form of influence in several areas of knowledge. Cybernetics has contributed to the development of profound forms of analysis of diversified types of systems, whether anthropic or natural, from computers to natural ecosystems.

His works also influenced Psychiatry and Communication Theory, which in turn is related to Psychiatry and Psychology.

Bateson's interdisciplinary character and his systems thinking are also important for the understanding and solution of environmental problems, which must be evaluated and solved in an inter/transdisciplinary and systemic way. In this sense, Bateson's epistemology is directly related to the Environmental Sciences by showing the ecological and sociocultural interconnection.

Finally, we highlight the concept of ecology of the mind and the pattern that connects, developed by this important thinker. Both concepts are similar and interactive that lead us to the idea of integration, of the unity of the mind with the environment (ecology of the mind) and, in addition, the idea of something that connects (connects) all things, that is present in all living beings and among all living beings (pattern that connects), present in and between all systems at their different levels of existence, as a kind of mind.

It is also worth asking: What would be the reflections of Bateson today, whose work deals with the mind and ecology, in the face of the acceleration of the environmental crisis (which is always socio-environmental) manifested by global warming and climate change, intense degradation of ecosystems that break the subtle relationships between lives, leading to the erosion of biodiversity and destruction of habitats? What would you say about the pollution of water, air and soil, the overexploitation of natural commons that cause deforestation, desertification, water scarcity and annihilation of life forms and putting the human species itself at risk? What would be your



perception of the socio-environmental inequality of access to resources and the configuration of environmental vulnerabilities? How would you look at the unsustainable form of production and consumption? How would you observe hyperurbanization? What look would you have at technological advances and artificial intelligence? How would you evaluate the ways of knowing that we use?

If we are taking great strides towards a world of machines endowed with "artificial intelligence", computers that learn and are being taught to learn with increasingly complex algorithms, how will the interaction with the human way of being and knowing be? How will the interaction with the environment take place?

Machines integrated into a network, a system, allow the exchange of data (information/kind of 'experiences') with each other in a feedback system that enhances the learning of the machines themselves, which already in our time have begun to replace and assist the human being in some activities and have the potential to interact with the natural environment and with the human mind and culture.

Can machines also be useful for understanding and solving complex environmental problems, or are they also part of the ecological problem that we face? From a systemic and interdisciplinary approach, with artificial intelligences developed and trained for this, it is possible that there is a need for new ways of thinking that deepen the understanding of relationships, as well as, it is possible, on the other hand, the emergence of forms of "instrumental artificial intelligences" that further deepen the exploitation and degradation of Nature, by the dismantling of ecological systems that are all interconnected, also interfering in the human world.

Another element to be questioned is what refers to the energy consumption by these Artificial Intelligence machines, which can cause great impacts on vital systems, adding degrees to the already intense environmental crisis, which is also a crisis of knowledge, as Leff (2006) postulates.

Returning to the aforementioned statement by Bateson (2011), that "the main problems in the world are the result of the differences between how Nature works and the way people think", one more question is worth asking here: Would we be reproducing in our time a "way of thinking" based on the opposition of culture and Nature, in disparity with the way the material basis of life works, the natural commons and forms of life and their ecological principles? How can we calibrate our thinking and knowledge to other more sustainable ways of existing in the world without breaking the relationship - the pattern that connects - with life in all its diversity? In what sense can the inter/transdisciplinarity of knowledge provide us with new directions?

It is true that Bateson is no longer with us, so it is up to the existing ones to reflect on the possible answers. Bateson's thought, present in his work, can be a light on the path of this great



challenge to free himself from the trap of fragmented knowledge and the social practices (cultural, political and economic) that arise from it and that increasingly weaken life on Earth.



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