

EMERGENTISM

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ABSTRACT: We may wonder if the emergentist model owes too much to the two traditional alternative approaches (first or third person), although it is aware of its weaknesses it fails to complete its interesting contribution with an anthropological approach that may consider mind and mental phenomena as a reality that emerges, matures, develops and expresses itself in its unavoidable interpersonal and social contexts, as is shown by the psychological and anthropological research into the study of the development of human personality. We consider that three complementary elements or dimensions should be taken into account: the *evolutionary* aspect (the biological maturing process of the brain, which represents the jump from prehuman to human existence); the *systemic* aspect (the systemic way to understand the mind as the total structure of the brain); and the *social* aspect (the interpersonal and social dimension as the field where the mind and the person originate). It is only within the context of human society that each personal reality can be shaped as such. Thus, this proposal could be referred to as *psycho-social-systemic emergentism*.

KEY WORDS: evolution, emergentism, Philosophy of Mind, dualism, mind-body problem, psycho-social-systemic emergentism.

Emergentismo

RESUMEN: En un cierto sentido podemos extrañarnos de que el modelo emergentista deba mucho a los dos enfoques tradicionales alternativos (primera y tercera persona). Aunque es consciente de su debilidad, no alcanza a completar su interesante contribución con un enfoque antropológico que considere la mente y los fenómenos mentales como una realidad que emerge, se desarrolla y se expresa en contextos sociales e interpersonales, como se muestra en la investigación psicológica y antropológica en el estudio de la personalidad humana. Creemos que tres elementos o dimensiones complementarias deben tenerse en cuenta: el aspecto *evolutivo* (el proceso de crecimiento biológico del cerebro que representa el salto desde lo prehumano a la existencia humana); el aspecto *sistémico* (el enfoque sistémico para comprender la mente como la estructura total del cerebro); y el aspecto *social* (la dimensión interpersonal y social como ámbito en que surgen la mente y la persona). Sólo en el contexto de la sociedad humana puede ser configurada como tal la realidad personal. Por tanto, nuestra propuesta podría ser entendida como un emergentismo psico-socio-sistémico.

PALABRAS CLAVE: evolución, emergentismo, filosofía de la mente, dualismo, problema mente-cuerpo, emergentismo psico-socio-sistémico.

1. INTRODUCTION

Emergentism is a reality interpretative theory or model, which has been specifically classified in the field of the new so-called *Philosophy of Mind*, but which is a concept that has its application and pertinence, as we will see, in other fields of scientific and philosophical reality.

The first references to the emergentist thesis arose in the field of biology, in order to designate, as J. Ferrater Mora suggests, a theory of evolution: the theory

¹ See FERRATER MORA, JOSÉ, *Diccionario de Filosofía* (Madrid, Alianza, 1980), 4 vols., word *Emergente*, vol. 2, 912-913; Cf. also *Emergentismo*, in QUINTANILLA, M. A. (dir.), *Diccionario de*

of *emergent evolution*, proposed by C. Lloyd Morgan, Samuel Alexander and others¹. From a unitary and dynamic conception of the whole reality, in which life rises from matter and awareness rises from life, it is understood that «each level of being is emergent with regard to the previous, lower, level». Thus, each level is unbeatable in its being and in its doing with regard to the previous level. However, C. Lloyd Morgan recognises that the concept of *emergence* had already been proposed by J. S. Mill in his *Logic*, where he defended that the laws of life cannot be drawn from the laws of its ingredients or parts. That is why it is fundamental within the emergentist theories to distinguish between the *emergent* and the *resulting* qualities, a distinction proposed by C. Lloyd Morgan at G. H. Lewes' suggestion, and later used as a key element by most emergentists. The so-called *resulting* qualities are those typical of the elements before the emergence of the new level, whereas the so-called *emergent* qualities will be the new qualities, typical of the newly emerged level.

Moreover, it is also convenient to state that the words *emerge* or *emergentism* do not exactly represent the most suitable ones, from the semantic point of view, to refer to this theory about reality and about the nature of mind. If we look it up in any Spanish dictionary, we are told that *emerger* means «brotar, salir a la superficie del agua u otro líquido»; *emergente*: «que emerge, que nace, sale y tiene principio de otra cosa»; and *emergencia*: «acción y efecto de emerger; suceso, accidente que sobreviene»². In that sense, we say that, for example, a submarine emerges from underwater. As can be seen, this semantic family, therefore, makes a reference to the fact that something that already existed before, hidden at a lower level, comes to the surface, without meaning that when emerging there is an essential change or innovation in the emerged reality. That is to say, it does not seem to imply that something *ex novo* appears in the fact of emerging, thus becoming that new reality at the same moment of its emergence, whatever the way in which such emergence or makeup is understood.

Nevertheless, the emergentist paradigm consists of defending the *makeup* of a new reality, based on a previous level of reality, arising from it and being *dynamically subtended* by it, as Zubiri said. Consequently, the difficulties and questions that the emergentist paradigm raises are exactly how a new and more complex reality arises from another different and less complex one. What the relation between the two levels of reality, both in their origin and in their being and doing is, and how to combine the emergentist vision with the general reductionist trend of current science. However, it also depends on the type of reductionisms we refer to, as there are different types: some are more radical, the eliminativist, and others are more integrating or agreeing.

We will start by comparing the emergentist strategy with the reductionist, to later show the emergentist paradigm in the field of physics and biology, and finally demonstrate the emergentist approaches in the field of philosophy of mind.

filosofía contemporánea (Salamanca, Sígueme, 1976), 120; Cf. *Emergencia*, in GREGORY, R. L. (ed.), *Diccionario Oxford de la Mente* (Madrid, Alianza, 1995), 345-348.

² See *Diccionario de la Lengua Española*, Real Academia Española (Madrid, 2001, 22.^a ed.).

2. REDUCTIONISM-EMERGENTISM: COMPLEMENTARY VISIONS OR STRATEGIES?

Reductionist and emergentist models are often understood as two different, but also irreconcilable, models to understand reality and the way in which it is organised. And this is so in their most extreme and radical versions, above all in the case of radical reductionism. But a more appropriate vision enables us to understand both approaches not as exclusive, but as complementary, while this reconciliation produces a more accurate and productive vision of reality.

2.1. *The different types of reductionisms*

In its fundamental thesis, the reductionist opinion defends that everything which exists can be explained from a unique level of reality, which is physics. We are going to specify its main statements and nuances from Fco. J. Ayala, who in several written works has done his best to clarify this intricate issue, and has been the organiser of a well-known conference of scientists and philosophers of different trends in order to try to conciliate opinions among them concerning this problem³. According to Ayala, the different reductionisms have to be situated in three different levels: *ontological*, *methodological*, and *epistemological*.

- a) At the *ontological* level, the question that is raised is whether everything is finally reduced to the physical matter, as the last reality. Considering this question, some theoreticians tend to go for an ontological reductionist solution (there is only one unique reality, matter), and others open up to a more pluralist ontology, with different levels and types of reality. Related to this we find the problem of clarifying «whether the physicochemical processes and entities are the grounds of the phenomena of life»⁴. In the past, vitalists were the main opponents to ontological reductionism from dualist opinions, as they proposed the existence of an abstract entity (*entelechy*, *vital strength*, *élan vital*, ...) as the cause of vital processes and the differences between living and inanimate beings. Nowadays very few defend these theses, and biologists understand that the laws of physics and chemistry are fully applied to the biological processes at the level of atoms and molecules. Another very different thing will be to defend that a living being is totally explained by the physicochemical laws.
- b) The *methodological* level makes reference to the strategy of research or of learning acquisition in a specific field. From this point of view, two strategies

³ The result of that conference, held in the Research and Conference Centre of the Rockefeller Foundation in Bellagio, Italy (1972), is the book *Estudios sobre la filosofía de la biología*, published by the very Ayala, together with his teacher T. Dobzhansky (Spanish translation: Barcelona, Tecnos, 1983).

⁴ See AYALA, Fco. J., «Introducción», in AYALA - DOBZHANSKI (eds.), *o.c.*, pp. 9-20; 10.

are raised: either by always looking for the explanations of the fundamental processes from the lower levels of complexity, or by doing so from the horizon of the study of levels of organisation of any type. This is fundamental for the question, for example, of whether the biological and the psychic have to be reduced or not to its physicochemical grounds. The former option is followed by the *exaggerated reductionists*, for whom the only valid explanations of a biological and psychic reality are those obtained by researching the fundamental physicochemical processes. However, for the *exaggerated antireductionists*, such explanations are not enough, and would not even belong to the field of the biological. On the contrary, we would have to turn to the specific level of biology, which was the new way of organisation or systematisation of reality that appeared with the emergence of life. According to Ayala, there are some misunderstandings about this point which will have to be sorted out, since most biologists admit the emergence of new systematisations or complexities in the field of life. But they decline the exaggerated antireductionism, accepting that many fields of the biological can be explained from the molecular or atomic level⁵. The problem is whether that explanation totally uses up the reality of the biological.

- c) In the *epistemological* field, the discussion is about the explanatory theories used to explain the different levels of reality. That is to say, «the general question, states Ayala, lies in whether the experimental theories and laws formulated in a certain scientific field can be considered special cases of theories and laws formulated in another. If this is the case, it is said that the first branch of science has been reduced to the second one»⁶. This would be the field where most philosophical discussions about reductionism are normally produced.

If we examine the history of the different sciences, we will notice that the general objective of all of them has always been aimed at the line of unification or simplification of knowledge, trying to reduce a branch of science, or a whole science, to another more basic one. This trend made up the central core of the philosophical programme of the *logical neopositivism* of the Society of Vienna⁷. In fact, a large part of chemistry has been reduced to physics, and many parts of biology have been reduced to chemistry and physics from the orientation of molecular biology and genetics. But, as Ayala states, «none of these and other reductions have turned out to be totally successful; in each case there is some unsolved remainder (see K. R. Popper, «The Scientific Reduction and the Essential

⁵ Ibidem, p. 11.

⁶ *O.c.*, p. 12.

⁷ KRAFT, VÍCTOR, *El Círculo de Viena* (Madrid, Taurus, 1977); KOLAKOWSKI, LESZEK, *La filosofía positivista* (Madrid, Cátedra, 1979); POPPER, K., *Lógica de la investigación científica* (Madrid, Tecnos, 1951); ADORNO, TH., and others, *La disputa del positivismo en la sociología alemana* (Barcelona, Grijalbo, 1973); HINTIKKA, J., and others, *Ensayos sobre explicación y comprensión* (Madrid, Alianza, 1980).

Incompleteness of All Science», in this volume)⁸. These reductions represent one of the most outstanding achievements of science»⁹.

The general trend in sciences has rather gone in the direction of unifying knowledge, trying to find the basic laws that reveal the unified operation of the universe. In that sense, there has been an outstanding success due to this reductionist determination. But, contrary to that reductive orientation, there has always been the opposite idea, the antireductionist one, which insists on the impossibility of totally reducing a higher level or reality to its lower level. In the case we are dealing with, we find the question of whether biology can be totally reduced to physics and psychology, or the field of the mind to biology.

W. H. Thorpe, quoting Carl Pantin, considers that there are two types of sciences: the *restricted* ones, above all physics, whose characteristic is not to seem to need concepts and methods from other sciences, as those of the science itself are enough; and the *non restricted* sciences, which need to continue the explanations and descriptions of their problems in the field of any other science. In that sense, Thorpe observes that «there is a great tendency among biologists to consider this process of searching for physical explanations as the most important part of their work, and therefore to be irresistibly reductionist in their methods and points of view»¹⁰. Following this dynamic, the reductionist trend in sciences is aimed at breaking reality into its different parts, trying to explain everything in terms of atoms and elemental particles. That is why the modern definition of reductionism, as I. Barbour states, is the attempt to «exclusively attribute reality to the smallest constituents of the world, and the trend to interpret higher levels of organisation in terms of lower levels»¹¹.

Therefore, in this problem of reductionism we notice the need to combine two complementary fields or aspects: an analytic view (aimed at the breaking down of a reality into its parts) and another synthetic one (aimed at studying the characteristics of the systematisations or structures with which reality is being organised). The mistake and the limitation that W. H. Thorpe notices in the *exaggerated reductionist* trend lies in not realising that every analysis process, however valuable and necessary, always has to be completed with the synthesis movement. Apart from that, the analysis movement, typical of reductionism, is an abstraction, and thus, it is a limited vision, since «it itself is an abstraction of a more complex and elaborate reality, and, in this sense, the term «restricted sciences» turns out to be suitable»¹². Actually, physics itself, as B. Russel already stated, needs mathematics to be able to be understood.

⁸ See AYALA, F. J. - DOBZHANSKY, T. (eds.), *o.c.*, pp. 333-364. Popper's article Ayala refers to is on pages 333-364 in that book.

⁹ AYALA, F. J., *o.c.*, p. 13.

¹⁰ THORPE, W. H., «El reduccionismo en la biología», in AYALA, F. J. - DOBZHANSKY, T. (eds.), *Estudios sobre la filosofía de la biología*, Barcelona, Ariel, 1983, 152-187; 152.

¹¹ *Issues in Science and Religion* (London, S. C. M. Press, 1966), p. 52 (quotation from W. H. THORPE, *o.c.*, 153).

¹² THORPE, W. H., *o.c.*, p. 153.

But the most convincing reason of Thorpe in favour of the need of synthesis is that our perceptive senses are designed to grasp syntheses, systems, forms (*Gestalten*), structures. And only after we grasp totalities do we go towards the analysis of those structures in order to work out their different elements or parts. Consequently, «the analysis is not only deceitful, or even worse, without a previous synthesis; but it also lacks meaning and is sometimes extremely dangerous if it is not followed by a synthesis, or at least by recurrent periods of it»¹³.

2.2. *The non-reductionist or emergentist suggestion*

Within an evolutionary vision of the whole universe, the most suitable and complete way to understand reality is, thus, analysing it from a vision that combines both analysis and synthesis. It will need both the work of breaking down of a whole in its parts, and that of understanding the specific laws of the different systems and structures that have been emerging along the dynamic and evolutionary process. Thus, we find the concept and the idea of *emergence*, which has to be seen as complementary to the analytic and reductive vision. Thorpe, turning to Broad, defines *emergence* as «the theory of the fact that the typical behaviour of the group *could* not, even theoretically, be drawn from the most complete knowledge of the behaviour of its components, taken separately or in other combinations, and from its proportions and dispositions in this group»¹⁴. According to this way of looking at things, two levels of reality have to be distinguished in every system or structure: that which corresponds to the parts and that of the whole. It is necessary to know how the parts behave outside the system, and under which law or laws those parts have come together so as to form a new system.

Bearing these distinctions in mind, it is usually common to make reference to Nagel's suggestion with his two conditions necessary and sufficient to be able to consider whether the process of epistemological reduction is correct. Nagel called them conditions of *derivability* and of *connectivity*¹⁵. The former claims that «in order to fulfil the reduction of a branch of science to another, it has to be shown that all the experimental theories and laws of the first are logical consequences of the theoretical facts of the second»¹⁶. On the other hand, the principle of *connectivity* states and orders that «all the technical terms of science that need to be reduced have to be defined again using terms of the science to which the first one is reduced»¹⁷.

¹³ Ibidem, p. 153.

¹⁴ BROAD, C. D., *The Mind and its Place in Nature*, London, Kegan Paul, Trench and Trubner, 1937 (quotation from W. H. THORPE, *o.c.*, p. 154. The text in italics is by the author).

¹⁵ NAGEL, E., *The Structure of Science*, New York, Harcourt, Brace and World, 1961; AYALA, F. J., «Biology as an Autonomous Science», in *American Scientist*, 1968, no. 56, pp. 207-221 [Spanish translation, «La biología como una ciencia autónoma», in AYALA, F. J., *La evolución de un evolucionista. Escritos seleccionados* (Valencia, Universidad de Valencia, 2006), pp. 105-122; ID., «Introducción», *o.c.*, p. 13].

¹⁶ AYALA, F. J., *o.c.*, p. 13.

¹⁷ Ibidem, p. 13.

Following these approaches, it is evident that the reductionist suggestions are unfeasible in many fields of reality, among which we can find biology with regard to physics, and the field of the mind with regard to biology (neurosciences) or physics. In all fields of science there have been theoreticians that have noticed the inadequacies of reductionism and the need for emergentist approaches. We will present some positions in physics and biology, in order to later focus on the field of philosophy of mind.

3. EMERGENTISM AS A SCIENTIFIC PARADIGM

3.1. *Some historical notes*

Although it may seem that the emergentist theses are recent and rather minority, they are not so recent or reduced to just a few authors and of secondary importance. There are more and more scientists and philosophers who are in favour of emergentism. As stated above, C. Lloyd Morgan and Samuel Alexander were the first authors who referred to the emergentist theses in order to defend an *emergent evolution*. However, according to that, Darwin himself would be the first who actually defended this opinion, as a consequence of his evolutionary vision of the world of life (biosphere). Following Matt Donnelley in his history of the emergentist paradigm in the Anglo-Saxon field¹⁸, we notice that after Darwin we can consider authors like Joseph Hooker (1871) and George Henri Lewes (1875) as defenders of emergentism at the height of the nineteenth century.

In the twentieth century, in parallel with the highest point of vitalism, there is a rebirth of emergentism thanks to Samuel Alexander (1920), C. D. Broad (1925) and Stephen Peppere (1926). And the great philosopher A. N. Whitehead can also be considered close to emergentism, with his theses on the process philosophy, during his teaching years in Harvard.

Throughout the following decades, there was a predominance of the reductionist opinions, considering emergentism an approach which was too speculative, and close to religious opinions, and not easy to demonstrate from the point of view of science. But the strong rebirth of emergentism took place in the sixties thanks to philosophers like Ernest Nagel (1961) and P. W. Anderson (1972). Moreover, it was consolidated with contributions from many others in the eighties and nineties, for example: M. Silverstein, P. Humphreys, Tim O'Connor, R. Klee, Terry Deacon, Philip Clayton, and even Stuart Kauffman, who started with a reductionist opinion which is perfectly harmony with the emergentist view¹⁹.

¹⁸ DONNELLEY, MATT, in an article on emergentism, published in the journal *Science & Theology News*, March 2006. Quotation from ARMENGOL, G., «El emergentismo, una vía humanista de la ciencia. Más allá del reduccionismo supera la imagen del *hombre máquina*», in <http://tendencias21.net/tendenciasdelasreligiones>, 23-08-2007, pp. 1-4; 1.

¹⁹ A complete view of the current situation of emergentism, in the Anglo-Saxon field, can be seen in CLAYTON, PHILIP - DAVIES, PAUL, *The Re-Emergence of Emergence*, 2006 (quotation from ARMENGOL, o.c., p. 3).

But this list can still be enlarged making a reference to several authors who defend emergentist opinions in the field of philosophy of mind, like Popper, Searle, M. Bunge, Edelman, etc. And in Spain, the philosophers Amor Ruibal and X. Zubiri have defended emergentist opinions, as well as their followers in the field of medical anthropology, Barraquer Bordán, P. Laín Entralgo and Diego Gracia, in addition to the psychologist José Luis Pinillos and the philosopher and epistemologist Javier Montserrat.

However, when we speak about emergentism two different opinions are usually distinguished: strong and weak, as Philip Clayton claims in his book *Mind & Emergence, from quantum to consciousness*²⁰. While *strong* emergence defends that evolution has been giving rise to new ontological levels of reality, with their own laws and causal strengths, *weak* emergence would maintain that only new qualities appear, keeping the same causal processes of the physical level. This weak mode is opposed to the classical reductionism, since it defends that emergence is the result of the evolutionary process that makes new unpredictable properties emerge, although to reach this opinion we only deal with new stages and new physical structures. That is, it is not a new reality that emerges but a larger complexity of the same physicochemical reality. Some, like D. Dennett, call this emergentism «innocent emergence». Therefore, we would have an opinion which defends an ontological monism and a pluralism of properties, as will be the case of M. Bunge in the field of the relations mind-body.

Both Ph. Clayton and Paul Davies, authors who have shared their ideas about this point in *The Re-Emergence of Emergence*²¹, are in favour of emergentism in the strong sense. Both authors comprehend that emergentism has to be understood in the strong ontological sense, as the evolutionary capacity of the physicochemical systems enables new properties to emerge. Such properties cannot be reduced to those of the lower physicochemical or biological level. They notice that these new properties have effects on the very physical or biological systems that have produced them. Thus, it is taken for granted that science can make experiments to demonstrate this causal relation between the two levels of reality. The emergentist paradigm would abandon the idea that it is a mere philosophical thesis, with quasi-religious notes, so as to become an approach subject to scientific experimentation. Important scientists do not defend anything else either in the field of physics or biology, as is the case of Robert B. Laughlin, Steven Johnson and others, as we are going to see below.

3.2. *Emergentism in the field of physics*

The emergentist paradigm is based on a unitary and evolutionary conception of the universe. Thus, all the elements that it consists of would be made up of

²⁰ Oxford University Press, 2004. David J. CHALMERS also makes that classification in *The conscious mind: in search of a fundamental theory* (New York, Oxford University Press, 1996).

²¹ 2006. I have asked the UC Library for this book, which has a new edition of 2008. For a wide presentation of Ph. Clayton's ideas on emergentism, Cf. LEACH, J., *o.c.*, 1-7.

the same basic reality (which has always been called *matter*. Nowadays, since the thesis of Einstein on the correlation between matter and energy, it is more difficult to maintain this *materialist* thesis). But these elements would be made up or structured in a different way, as a consequence of a long evolutionary process²². That is why now some scientists defend that reality is not only made up of matter and energy, but also of structures or forms, from the *theories of complexity*²³.

The dynamic conception of reality²⁴ leads us to recognise that the whole universe is inter-related in its intrinsic dynamic capacity to *give rise to something else* (Zubiri). Since the initial bang that gave birth to our universe, the material reality was transforming and becoming more complex until it produced the emergence of living matter on a small planet (although science still does not know how, when and where that jump was made). Life has produced evidence of an enormous potentiality, creating multiple living species, becoming more and more complex until the human species emerged.

This dynamic and emergentist condition of reality, as can be seen, is not a rare phenomenon, but rather frequent. We can claim, like the biophysicist of Yale, Harol Morovitz, in a recent book, that in the history of the universe there would have been up to 28 levels of emergence²⁵. Therefore, the presence of emergentist jumps is not a mere philosophical-theological lucubration, but a phenomenon that a wide array of scientists has been observing in the widest fields of reality. In the field of physics, it is important to notice the defence of emergentism made, among others, by Robert B. Laughlin, Nobel Prize for Physics in 1989, in his book *A Different Universe. The Reinvention of Physics in the Age of Emergence*²⁶. In the defence of the emergentist model, Laughlin is aware that «the term «emergence» has acquired a range of meanings, among which we can include natural phenomena that are not governed by the laws of physics. I do not use the word in that sense, but I refer to a physical principle of organisation»²⁷. Laughlin notices that there are two complementary ways to understand and interpret reality: the reductionist and the emergentist, models that on many occasions are seen as opposite and incompatible by reductionists. These

²² The theories of A. N. Whitehead and his philosophy of the *process* (*Proceso y realidad*, Buenos Aires, Losada, 1956), as well as X. Zubiri (*Estructura dinámica de la realidad*, Madrid, Alianza/Fundación Xavier Zubiri, 1989), or Teylhard de Chardin (*El fenómeno humano*, Madrid, Taurus, 1967).

²³ Cf. GOODWIN, B., *Las manchas del leopardo. La evolución de la complejidad* (Barcelona, Tusquets, 1998); KAUFFMAN, S., *At home in the universe. The search for the laws of self-organisation and complexity* (New York, Oxford University Press, 1995).

²⁴ Cf. ZUBIRI, X., *La estructura dinámica de la realidad* (Madrid, Alianza/Fundación Xavier Zubiri, 1989).

²⁵ Information quoted by Philip Clayton, *Mind & Emergence, from quantum to consciousness* (Oxford University Press, 2004). I take the information from Javier Leach, «La ecuación entre conocimiento y ciencias de la naturaleza no es exacta», in <http://www.tendencias21.net/tendenciasdelasreligiones>, p. 3.

²⁶ Buenos Aires, Katz Editores, 2007.

²⁷ Ibidem, p. 29.

understand reality as a mere association of parts, and their epistemological strategy is aimed at pointing to those parts that everything is made up of, trying to show the causal laws that inter-relate them. On the contrary, the emergentist opinion understands that we have to distinguish the level of the parts and that of the organisation or system, in such a way that «we can *prove* that the organisation can acquire its own meaning and life and transcend the parts that make it up. Then, what physics tells us is that the postulate by which the whole is more than the addition of the parts is actually a physical phenomenon. Nature is governed not only by a basis of microscopic rules, but also by general strong principles of organisation»²⁸.

This does not involve the elimination of the reductionist look, but its delimitation to the field that corresponds to it. It has to be complemented with the emergentist view, as we have already said and here it is well stressed by Laughlin. It does not make sense to take only one of the two sides, since, Laughlin continues stating, «all the laws of physics—and not only some— have a collective origin—. I mean that the distinction between fundamental laws and laws that stem from these is a myth, the same as the idea that the universe can be dominated by means of mathematics exclusively. In general, the physical laws cannot be predicted only with thought: they must be found out by the empirical way, while the control of nature can only be achieved when it permits it by means of a principle of organisation. We could speak about the end of reductionism (the belief in the fact that phenomena are clarified when divided in smaller and smaller components), but it is not exactly so. It is not my intention to declare the death of reductionism, but giving it its place in the general order of things»²⁹.

In this way, as Laughlin also states, in the world of science we are changing from a way of seeing things that consists almost exclusively in breaking them down in their smallest parts to another view in which the aim of understanding how nature is organised is predominant³⁰. And from that view, it is noticed that «in nature the simple thing is the exception and not the rule». Thus, certain fields of reality can ascend to a higher level of organisation, if the suitable circumstances arise, like from a crystalline surface to a living structure. It is impossible to foresee this jump, it cannot be proved that it will happen, but, as Laughlin says, «it can be proved that the emergence is reasonable and is not against common sense»³¹. This is what we are told in the *theory of complexity*, a branch of mathematics created in the 1970s, which deals with chaos, the fractals and the cellular automata³².

²⁸ *O.c.*, p. 17. The underlined text is by the author.

²⁹ *Ibidem*, p. 18. «Science has passed from the Era of Reductionism to the Era of Emergentism, that is, a time in which the search for the ultimate causes of phenomena has moved from the behaviour of the parts to the behaviour of the whole», *Ibidem*, p. 254.

³⁰ *Ibidem*, pp. 106-107.

³¹ *Ibidem*, p. 168.

³² MANDELBROT, B. B., *La geometría fractal de la naturaleza* (Barcelona, Tusquets, 1997).

The complexification of non-living matter has produced, by emergence, the living matter, where emergence has also been happening continuously, above all due to the appearance of the different living species.

A similar emergentist opinion is presented by Steven Johnson, in his book *Emerging Systems. Or what ants, neurons, cities and software have in common*³³. He is not so optimistic and categorical as Laughlin when it comes down to claiming the present control in the field of sciences of the emergentist paradigm or model. In spite of this, he notices that this model is increasingly making its way among scientists, both in the field of physics and above all in that of biology. Living beings have generated from a first living cell that has been able to replicate itself. Later on multicellular bodies have developed, in which cells have learnt to live together and to distribute functions. Thus, each new species of living being is the emergence of a new form of systematising and organising in order to survive, reproduce and interact with the environment and the remaining living beings. The strange thing is that the emergence of a new organisational model of life is not due to a systematisation in which there would be an element that plays the role of organiser or *pacemaker*, but rather a consequence of an emergent jump without the need for such central or organisational element. Steven Johnson makes reference in his book to several emergent systems in which the need for the presence of such *pacemakers* is not noticed. In the first place, this is the case of the organisational behaviour of the mold of mud and of the colonies of ants or bees, whose discovery was made by the Japanese scientist Toshiyuki Nakagaki. Thus, «the aggregation of the mold of mud is recognised as a classical case for the study of the rising conduct or *bottom-up*»³⁴.

According to Johnson, for «the scientists who try to understand the systems that use relatively simple components to build superior intelligence, the mold of mud will be considered the equivalent of the chaffinches and the tortoises that Darwin observed in the Galapagos Islands»³⁵. E. F. Keller and L. Segel took the first investigations of Nakagaki about the mold of mud. And they manage to work out the strange systemic nature of its behaviour as a structure that does not need pacemakers or elements of upper hierarchy that orders the movements of its subordinates, like a military battalion or any other organised group. Thus, quick strides have been made towards the making up of the basis of the sciences of complexity and self-organisation. These sciences deal with the study of rising, not descending, systems, which extract their intelligence from the base. That is to say, «they are complex systems of adaptation that spread emergent behaviours. In these systems, the agents that lie in a scale start to produce behaviours that lie in an upper scale: ants create colonies, the inhabitants of a city create neighbourhoods, software of simple pattern recognition learns to recommend books. The evolution of simple to complex rules is what we call *emergence*»³⁶.

³³ México, FCE, 2003.

³⁴ JOHNSON, S., *o.c.*, p. 17.

³⁵ *Ibidem*, p. 13.

³⁶ *Ibidem*, p. 19. The text in italics is by the author.

These new more complex emerging bodies have the power of becoming ever more intelligent and they adapt to the environment in an increasingly more perfect and complex way. And, from this point of view, we have to understand and study the evolutionary process in the field of biosphere, from the protozoan to the *homo sapiens*, in which the last emergence arises: the self-conscious mind. But the complexification of social structures like the making up of cities can also be seen as an emergence process. In his book S. Johnson describes these emergentist processes which are so interesting and instructive, completing the observations Engels once made about the formation of the city of Manchester³⁷.

Even S. Johnson refers to the fact that we would be entering a new stage in the evolution of the emergentist paradigm, which consists in having turned from finding out the processes of emergentist complexity in nature to producing them artificially. We are turning, then, from understanding emergence to generating it. That can be seen in all the *software* programmes which are created to generate games or music or art programmes in general. This is the advent of artificial emergence³⁸. This is what makes Johnson say, parodying Marx: «Up to now, emergence philosophers had fought to interpret the world. Now they begin to change it»³⁹. This is a really suggestive and clarifying approach, but it leads us beyond the aims of these pages.

3.3. *Emergentism in the field of biology*

Since the nineteen-twenties three rival approaches have been competing for supremacy in the field of biology: vitalism, reductionism and emergentism. Vitalist opinions were defended by scientists and philosophers as important as Hans Driesch and Henri Bergson, who proposed the existence of a vital strength, a specific *élan vital*, responsible for the special behaviour of living beings⁴⁰. This vitalist opinion was never taken seriously enough, and later has developed towards dualist opinions within the philosophy of mind, as is the case of the neurophysiologist J. Eccles, following the dualist theses of Descartes and his disciples.

The reductionist opinion, followed by a vast majority of scientists and philosophers, is much more influential nowadays. It tends to reduce the group of phenomena existing in the field of the biosphere to the physical laws. This tendency had received, as G. Armengol states, two recent strong supports: «Firstly the development of the biochemistry of nucleic acids (DNA) which have enabled us to understand that life is built from a strict mechanism (heredity and

³⁷ Cf. *Ibidem*, p. 36 and the following ones. It is also interesting to see the reference to the similarity between the plan of the city of Hamburg, in the middle of the nineteenth century, and the form of a human brain: Cf. *Ibidem*, p. 10.

³⁸ The second part of S. Johnson's book is dedicated to these emergent systems, produced by artificial emergence.

³⁹ *Ibidem*, p. 22.

⁴⁰ ORTEGA Y GASSET, J., «Ni vitalismo ni racionalismo» (1924), *Obras Completas*, vol. III (Madrid, Revista de Occidente, 1966), pp. 270-280.

embryogenesis). Secondly computer formalisms which have led us to the computer theories of life: its observational complexity (very difficult to explain until now owing to the classical mechanism of the nineteenth century) would derive from the fact that evolution would have designed living beings as *biological computers*⁴¹. The reductionist thesis is still the most widespread opinion in the world of biology, based on an idea of the «machine man», specified in the eighteenth century by Lamettrie, and now reinforced by the advances in genetics and computer functionalism in the field of philosophy of mind.

But, as we have stated above, it is very difficult to defend the fact that the field of biology, characterised by *teleological* or *teleonomical* dynamics, can fully be reduced to the laws of physics. That is why the third opinion, the emergentist one, arose strongly. The defenders of emergentism consider that the first emergentist in the field of biology was Darwin himself, since he defended qualitative jumps that corresponded to the appearance of each living species, as specific and original forms in which living matter was organised. The basic argument to defend the unbeatability of the biological to the physical is focused on the fact that teleology is present in the biological. But we have to be aware that there are different types of teleologies.

We have already referred to the two extreme opinions within the reductionist programme: on the one hand, the vitalist or dualist, and on the other hand, the extreme or exaggerated reductionist ideas. But Ayala understands that between them there are also two intermediate opinions. The first defends that, although it is not possible to reach the reductionist ideal in the current state of science, it could be possible in the future. And the other defends that this reduction is impossible in principle. As, as we have already stated, living bodies are not a mere aggregation of atoms and molecules, or organs and tissues, but groups that form *wholes, systems, structures*, with their specific laws. Their explanation cannot be reduced to the study of the mere behaviour of their parts.

Ayala tends to favour this latter opinion, but slightly distances himself from it too. His disagreement becomes a reality in the fact that his approach, and also that of the other opinion, is based on metaphysical assumptions which cannot be proved by science. And above all on the fact that the level of reflection at which the problem has to be situated is the epistemological one, not the ontological one. That is to say, «the question of reduction, according to Ayala, is whether the proposals concerning bodies can logically be derived from the physicochemical laws and not whether the qualities of bodies can be explained as a result of the qualities of their physical components»⁴². That is why, for Ayala, the question of reductionism has to adhere to the current situation of science, and not so much to whether in the future it will or will not be possible for us to achieve a total reduction, as that question cannot be solved empirically.

⁴¹ ARMENGOL, G., *o.c.*, p. 1.

⁴² AYALA, F. J., *o.c.*, p. 111.

Therefore, stemming from this approach, Ayala understands and defends that biological bodies move with teleological patterns of explanation, which do not exist in the field of the inanimate, and which cannot be explained from the point of view of physicochemical laws, without losing some explanatory content on the way.

In order to be able to maintain these statements, we first have to define the concept of *teleology*. Ayala is aware that this term «is discredited» in the environment of modern science, and it is seen by many as «a sign of superstition», which is not subject to empirical verification, and as a rest of «a pre-scientific era»⁴³. But this is due to the fact that we think that a teleological action is caused by an agent which is external and not immanent to the body itself. That is why one of the achievements of the theory of the natural selection of Darwin, as the driving force of evolution, consisted in changing in the field of biology a theological or dualist teleology into another scientific one. «The teleology of nature could now be explained, at least in principle, as the result of natural laws that are shown in natural processes, without turning to an external Creator or to spiritual or immaterial forces. It was at this point that biology grew as a science»⁴⁴.

Therefore, if in the field of human actions we notice a teleological structure in which there is a self-conscious agent with *prospective* and advancing rationality, this is not so in the field of biological phenomena, where we have to distinguish among different ways to understanding teleology. All the teleological movements have in common that they are «actions, objects or processes that show an orientation towards certain final aim or state»⁴⁵. Therefore, it is fundamental that «the object or process contributes to the existence of a certain state or quality of the system»⁴⁶. That is why we can speak about teleology in the working of a kidney, and not so much in the movements of a planet or in a chemical reaction.

That is why it is essential, so as to clarify concepts, to distinguish between three types of teleological phenomena, as Ayala states, depending on the relationship between the structure or the process and the final quality or state. Following this opinion, Ayala distinguishes three types of *teleologies*⁴⁷:

- 1) *Conscious Teleology*: in which «the final state or aim is consciously anticipated by the agent»⁴⁸. Some use the concept of *prospective* rationality⁴⁹

⁴³ Ibidem, p. 112. Anyway, perhaps it would be better to refer to *teleonomy* to make reference to biological dynamisms, reserving *teleology* for the human actions, in which there is a conscious subject that foresees and performs an action.

⁴⁴ Ibidem, p. 113.

⁴⁵ Ibidem, p. 114.

⁴⁶ Ibidem, p. 114.

⁴⁷ Cf. Ibidem, 114-116.

⁴⁸ Ibidem, p. 114.

⁴⁹ GARCÍA BACCA, J. D., *Curso sistemático de filosofía actual* (Universidad Central de Venezuela, Caracas, 1969), pp. 169 and the following ones. García Bacca distinguishes between prospective (teleological) and retrospective rationality, with hindsight. Cf. BEORLEGUI, C., *García Bacca. La audacia de un pensar* (Bilbao, Universidad de Deusto, 1988), pp. 156-161.

in order to refer to this type of teleology, which would exclusively arise in human beings, and it is likely to incipiently arise in certain primates. Those who deny the existence of teleological processes in biology are likely to do so because they reduce this concept to the conscious meaning.

- 2) Teleology of *self-regulated or teleonomical systems*, when there is a «mechanism that allows the system to reach or maintain a specific quality despite the fluctuations of the environment»⁵⁰. One example of these systems is the homeostatic ability of mammals to maintain a fixed body temperature. Apart from this, it is interesting to see that biologists distinguish two types of homeostasis: *physiological* and *developing*. The bodies that possess the first are able to maintain certain physiological states. However, the *developing* homeostasis is the ability to «regulate the different routes that a body can follow in its progress from zygote to adult»⁵¹. The gestation process of living beings belongs to this type of homeostasis, making up a well defined process that goes through different stages aimed at a clear objective, but this process is not ruled by an external conscious authority. Within this type of *teleonomical* processes we can also find the mechanical systems technically made by the human being, like a thermostat, because they are made up with a self-regulation system through information feedback.
- 3) The third type of teleology is the one of the organs or parts of the body of living beings, like the hand, the circulatory or breathing system, etc. All of them are examples of «structures which are anatomically and physiologically made up to perform a specific function»⁵². Like the physiological organs, the tools and artefacts built by human beings also belong to this type of teleology, because they are made up in a specific way to perform a function. As can be seen, the distinction between these latter types of teleology is somewhat vague, because the third type can also have and usually has certain capacities of self-regulation and feedback.

If in the field of living bodies there is no conscious teleology, it is clear that the rest of teleological structures and homeostasis are the result of the process of adaptation to the environment (natural selection). They are arrangements that are justified because of the contribution to the process of reproduction of the species. But they are mechanistic and impersonal processes, with *retrospective*, not *prospective* rationality. From this point of view, we can also speak about two levels of teleology: *specific* and *generic*. It is the *specific* final dynamism that permits us to connect the character or way of being of a body, or part of it, to the function it performs. But the generic and ultimate aim pursued by all the characteristics and their functions is successful reproduction. Therefore, from

⁵⁰ AYALA, F. J., *o.c.*, 115.

⁵¹ *Ibidem*, p. 115.

⁵² *Ibidem*, p. 116.

this point of view, «the ultimate source of explanation in biology is the principle of natural selection»⁵³.

But, as Ayala specifies, natural selection can be considered both a teleological process, and the opposite. That is to say, on the one hand, «natural selection can be said to be a teleological phenomenon in a causal sense. Natural selection is not an entity but a simply mechanistic process. But natural selection can be said to be teleological in the sense that it produces and maintains organs and mechanisms aimed at an objective, when the functions they perform contribute to the reproductive efficiency of the body»⁵⁴. But natural selection cannot be said to be teleological in the sense that it is directed at the production of certain and specific bodies or species. In that sense, natural selection is mechanistic and opportunist. And the final result of a species can be both successful adaptation and extinction. The trend of natural selection is to provide bodies with efficient mechanisms for survival, but it does not perform this trend consciously⁵⁵. That final state is causally and temporarily subsequent (*retrospective* rationality).

In any case, a proof of the complexity of the teleological phenomenon is numerous classifications can be made, according to the different points of view from which it is looked at. If the classification above was made by Ayala from the relation between «the object or mechanism and the function or quality it serves», he himself makes another complementary classification, «considering the process or agency which originates the teleological system»⁵⁶. From this second point of view, we can speak about *internal* and *external* teleology. Another way to refer to them is, respectively, *natural* and *artificial* teleology. The former is the typical one of living bodies and their characteristics, and the latter, that of tools and human servomechanisms.

Having reached this point, we have to wonder whether these teleological processes can be explained from the grounds of physicochemical processes. Ayala thinks it is evident that, although «teleological explanations are totally compatible with causal considerations», in fact «the teleological explanation implies something more than its non teleological equivalent»⁵⁷, so Nagel's two conditions for a correct process of reduction from one science to another are not fulfilled. Since a teleological process is organised in order to pursue an aim, which is not found in the field of simply causal relations, that is, in the field of physical chemistry. Moreover, teleological explanations show the presence of specific functions in the system and of a directing organisation of that system. Thus, the performance of the heart depends on pumping of blood. And, finally, as we saw earlier, the relation between aim and means serves a more generic aim, result of natural selection, like successful reproduction.

⁵³ Ibidem, p. 117.

⁵⁴ Ibidem, p. 117.

⁵⁵ Ibidem, p. 118.

⁵⁶ Ibidem, p. 118.

⁵⁷ Ibidem, p. 119.

In conclusion, «the use of explanations in biology is not only acceptable but actually essential. Bodies are systems organised in a directed way»⁵⁸. And in view of the objection of some authors, who do not see a clear difference between teleological and non teleological systems, as a distinction between both processes Ayala proposes the opinion of usefulness, applicable both to cases of external and internal aim. In the second case, a system will be teleological «if the characteristic is useful for the system in which it exists and if that usefulness explains the presence of the characteristic in the system»⁵⁹, thus contributing to its adaptability and to successful reproduction. If we refer to the external aim, we will say that usefulness is checked and it refers to the system's author, in this case, the tools and artefacts created by human beings: artefacts are the way they are because they serve and are useful to perform certain tasks. Thus, «the opinion of usefulness introduces a necessary objectivity to determine which biological mechanisms are directed at an aim»⁶⁰.

That does not mean that all the characteristics of a living body are useful (as some Darwinists have defended on occasion), but there have also been cases in which certain characteristics that have not been adapted in their origin can later be restructured into useful ones⁶¹. This is the idea that Fr. Jacob defends. He says that evolution is similar to a *do-it-yourself* system, since it does not act in a conscious way and with prospective rationality, but in a *sloppy* way with hindsight, adapting what it has in order to make the most of things⁶².

In conclusion, biological systems cannot fully be explained without a reference to teleology, and are actually the only systems that have internal teleology. Similarly, teleology is not useful in the field of physics and chemistry. That is why, from this essential point of view, it is unsuitable to defend that the field of biology can be reduced to explanations that are typical of the physicochemical laws. Thus, «teleological explanations distinguish biology from the rest of natural sciences»⁶³. The conclusion is that biology is an emergent level regarding physics and chemistry. And the same has to be said about the psychic with regards to the biological.

4. THE EMERGENTIST PARADIGM IN THE MENTAL FIELD

If up to now we have shown emergentist theories in a global sense, it is time to focus on emergentism as a model or paradigm within the philosophy of mind

⁵⁸ Ibidem, p. 120.

⁵⁹ Ibidem, p. 121.

⁶⁰ Ibidem, p. 121.

⁶¹ GOULD, STEPHEN JAY, *El pulgar del panda. Reflexiones sobre historia natural y evolución*, Barcelona, Crítica, 1994. There are some authors who call this phenomenon *ex adaptation*: re-adaptation of a characteristic to a new aim, different from the one they have had in earlier species in the evolutionary process: Cf. DUPRÉ, J., *El legado de Darwin. Qué significa hoy la evolución* (Buenos Aires, Katz Editores, 2006), p. 58.

⁶² *La lógica de lo viviente*, Barcelona, Laia, 1977.

⁶³ AYALA, F. J., *o.c.*, p. 122.

and neurosciences. It is probably here where the emergentist model can be applied at its best.

4.1. *Emergentism, between dualism and reductionism*

The soul-body or mind-body problem became a current issue in the second half of the 20th century with the rebirth of the new *philosophy of mind*⁶⁴, which started in the Anglo-Saxon world as a reaction to the absolute predominance of behaviourist theories, both in their psychological or scientific version and in their philosophical or logical one⁶⁵. Towards the mid 20th century behaviourism went into a decline due to advances in the different areas of the study of animal and human behaviour such as ethology and neurophysiology but above all because of the appearance of the so-called cognitive sciences⁶⁶.

Both psychological and logical behaviourism denied the ontological reality of the mind reducing the traditional field of psychology to the study of conduct and defending the fact that *mental states* are just states or behavioural dispositions. However, it became ever clearer that the behavioural structure of the human being could not merely be reduced to a simple stimulus-response pattern. In this way, it was obvious that the mental aspect has its own objective entity and it cannot be reduced to simple behavioural responses to external stimuli.

The rejection of the behaviourist paradigm started with two different theories: first, the *identity theory* (IT)⁶⁷ and later *functionalism*⁶⁸, the philosophy of mind from *cognitivism*. Although the theory of identity understood the mind as an objective reality, it reduced it to the simple biological work of the brain. In short, for this theory the mental aspect is the physical reality of the brain. However, contrary to both behaviourism and the *identity theory* (IT), *functionalism* considers that the mind should be understood in terms of brain *function* distinguishing between the physical components of the brain, which enable the existence of both the mind and mental states, and the function that is present in all mental states. Hence, mental states are brain functions. Apart

⁶⁴ GARDNER, H., *La nueva ciencia de la mente* (Barcelona, Paidós, 1987; 2.^a ed., 2000); CHURCHANLAND, P. M., *Materia y conciencia. Introducción contemporánea a la filosofía de la mente* (Barcelona, Gedisa, 1999); MARTÍNEZ-FREIRE, P. F., *La nueva filosofía de la mente* (Barcelona, Gedisa, 1995); LIZ, M., *Perspectivas actuales en filosofía de la mente* (Tenerife, Gobierno de Canarias, 2001); BRONCANO, F. (ed.), *La mente humana* (Madrid, Trotta, 1995); MOYA, C., *Filosofía de la mente* (Valencia, Universitat de València, 2004); MARTÍNEZ-FREIRE, P. F. (ed.), *Filosofía actual de la mente* (Contrastes, Suplemento 6, Valencia, 2001).

⁶⁵ PRIEST, S., *Teorías y filosofías de la mente* (Madrid, Cátedra, 1994), ch. II, «Conductismo lógico», 55-87.

⁶⁶ GARDNER, H., *La nueva ciencia de la mente. Historia de la revolución cognitiva, o.c.*

⁶⁷ RABOSI, E., «La tesis de la identidad mente-cuerpo», in BRONCANO, F. (ed.), *o.c.*, 17-42; CANDELA, J. A. - CAÑÓN, C. - HORTAL, A., «Monismos, Dualismos y Emergentismos», in DOU, A. (ed.), *Mente y cuerpo* (Bilbao, Mensajero, 1986), 19-64.

⁶⁸ GARCÍA-CARPINTERO, M., «El funcionalismo», in BRONCANO, F. (ed.), *o.c.*, 43-76; PRIEST, S., *o.c.*, cap. V, *Funcionalismo*, 163-181; PUJADAS TORRES, L. M., *La ascensión y caída de la teoría funcionalista de la mente* (Palma de Mallorca, Universitat de les Illes Balears, 2002).

from the concept of function, functionalism is based on another key issue: *functional description*. A *functional description* consists of the description of a causal process, that is, it states how a set of causes or external reactions (input) result in a set of responses (output) by means of a certain set of processes. The brain system can be considered and presented in any of its states as a series of *functional descriptions*.

Although, as more advanced than behaviourism, the *identity theory* (IT) implied the revival of the instrumental and innate role of the brain in the execution of behaviour, it failed to distinguish the material base of the brain from the functional aspect of a mental state. One of the main issues in all types of functionalism is the use of the computer metaphor to understand the problem of the relationship between the mind and the brain. The mind-brain relation is parallel to the relationship between *software* and *hardware* in a computer, where the program or *software* is the important part and the material support or *hardware* is irrelevant.

In spite of the important effects that both theories, IT and functionalism, had on the studies about mind and behaviour, none of them could avoid their opponents' criticism. The most relevant criticism referred to the lack of ability to recognise the inner aspect of the mind, that is, the subjective experience or the so-called *qualia*, the problem called «inverted spectrum» and the way to explain how the program (*software*) interacts with its material base (*hardware*)⁶⁹ Although the proponents of both theories were aware of those problems, they did not consider them strong enough to destroy their foundations and they considered them just a reason to partly reformulate their initial approach.

Taking all these problems into account and due to the fact that dualist attitudes⁷⁰ are neither very convincing nor close to current scientific or philosophic advances (from the point of view of dualism, it is difficult to make people believe how body and mind interact if we understand them as different ontological substances) we nowadays believe that *emergentist* theories are the most valuable approach in the field of philosophy of mind⁷¹. Moreover, it is clear that the forced dilemma between physicalism and dualism, as if they were the only two valid approaches, is coming to an end. This does not mean that emergentism is a solution or a full theory. None of them are, and, like all theories, it has its own weaknesses and it raises questions that cannot be fully explained.

⁶⁹ RABOSI, A., *o.c.*, 23-31; GARCÍA-CARPINTERO, M., *o.c.*, 67-74.

⁷⁰ About dualisms, PRIEST, S., *o.c.*, 25-53; CANDELA, J. A., «El dualismo interaccionista», in DOU, A. (ed.), *o.c.*, 33-44. Maybe add some work from Eccles (El yo y su cerebro, Eccles'part).

⁷¹ For the range of approaches to the mind-body relationship, Cf. BUNGE, M., *El problema mente-cerebro. Un enfoque psicobiológico* (Madrid, Tecnos, 1985); CHURCHLAND, PAUL, *Materia y conciencia. Introducción contemporánea a la filosofía de la mente* (Barcelona, Gedisa, 1999); MONSERRAT, JAVIER, *Epistemología evolutiva y Teoría de la ciencia* (Madrid, UPCO, 1984), ch. VI, 161-203.

4.2. Basic elements and significant differences within emergentism

Inside *emergentism* there are philosophers with very different attitudes but, in spite of their differences, they coincide in the most basic aspects so it is appropriate to put them all under the heading of *emergentism*. We are not going to analyse the whole range of emergentist writers⁷² in detail, but we will systematically explain the main theories within emergentism and point out the most significant disparities between different emergentists.

We are going to consider K. O. Popper⁷³, M. Bunge⁷⁴, J. Searle⁷⁵, J. Monserrat⁷⁶ and P. Laín Entralgo⁷⁷ the most relevant emergentist writers. They all give their theories a different name, from M. Bunge's *emergentism or systemic monism*, Popper's *interactionist emergentism*, J. Searle's *biological materialism*, J. Monserrat's *humanist emergentism or humanist emergentist monism*, to P. Laín Entralgo's *dynamic structuralism*. Within the emergentist paradigm there are also other philosophers like Edgar Morín⁷⁸, R. W. Sperry⁷⁹, G. M.

⁷² BEORLEGUI, CARLOS, *Los emergentismos sistémicos: Un modelo fructífero para el problema mente-cuerpo*: Pensamiento 62 (2006), issue 234, 391-439.

⁷³ POPPER, K. - ECCLES, J., *El yo y su cerebro* (Barcelona, Labor, 1980); POPPER, K., *Knowledge and the body-mind problem. In defence of interaction* (Londres/Nueva York, Routledge, 1994). Spanish trans.: *El cuerpo y la mente* (Barcelona, Paidós, 1997), with an introduction from J. A. Marina.

⁷⁴ BUNGE, M., *El problema mente-cuerpo. Un enfoque psicobiológico* (Madrid, Tecnos, 1985); *Epistemología* (Barcelona, Ariel, 1980); *Materialismo y ciencia* (Barcelona, Ariel, 1981); *Racionalidad y realismo* (Madrid, Alianza, 1985), ch. 9.º, «Explicaciones psicológicas», 89-103.

⁷⁵ SEARLE, J., *Mentes, cerebros y ciencia* (Madrid, Cátedra, 1985; 4.ª ed., 2001); «Mentes y cerebros sin programas», in RABOSI, E. (comp.), *Filosofía de la mente y ciencia cognitiva* (Barcelona, Paidós, 1995), 413-442; *El redescubrimiento de la mente* (Barcelona, Crítica, 1996); *El misterio de la conciencia* (Barcelona, Paidós, 2000); *Razones para actuar* (Oviedo, Ediciones Nobel, 2000); *Mente, lenguaje y sociedad* (Madrid, Alianza, 2001); *Libertad y neurobiología* (Barcelona, Paidós, 2005).

⁷⁶ MONSERAT, J., *Epistemología Evolutiva y Teoría de la Ciencia* (UPCO, Madrid, 1987), especially chapter VI; ID., *La percepción Visual. La arquitectura del psiquismo desde el enfoque de la percepción visual* (Madrid, Biblioteca Nueva, 1998), ch. XIV; ID., *Engramas neuronales y teoría de la mente*: Pensamiento 57 (2001), issue 218, 177-211.

⁷⁷ LAÍN ENTRALGO, P., *Nuestro cuerpo. Teoría actual* (Madrid, Espasa-Calpe, 1989); *Cuerpo y alma. Estructura dinámica del cuerpo humano* (Madrid, Espasa-Calpe, 1991); *Alma, cuerpo, persona* (Círculo de Lectores, Barcelona, 1995); *Idea del hombre* (Barcelona, Círculo de Lectores, 1996); *Qué es el hombre. Evolución y sentido de la vida* (Oviedo, Ediciones Nobel, 1999); «El problema alma-cuerpo en el pensamiento actual», in MORA, F. (ed.), *El problema cerebro-mente* (Madrid, Alianza, 1995), pp. 17-35.

⁷⁸ MORIN, E., *El método. La naturaleza de la Naturaleza* (Madrid, Cátedra, 1981); ID., *El método. La vida de la vida* (Madrid, Cátedra, 1983); ID., *El paradigma perdido. Ensayo de bioantropología* (Barcelona, Kairós, 1974; 3.ª ed., 1983); GÓMEZ-GARCÍA, P., *La antropología compleja de Edgar Morin. Homo complexus* (Granada, Universidad de Granada, 2003).

⁷⁹ SPERRY, R. W., «Neurology and the Mind-Body Problem», in ISSACSON, R. (ed.), *Basic Readings in Neuropsychology* (New York, 1964), 403-429; *A Modified Concept Of Consciousness*: Psychological Review 76 (1979) 532-536; «Mental Phenomena as Causal Determinants in Brain Function», in GLOBUS (ed.), *Consciousness and Brain* (New York-London, 1976); «Forebrain Commissurotomy and Conscious Awareness», in J. ORBACH (ed.), *Neuropsychology after Lashley*

Edelman⁸⁰, Francis Crick⁸¹, Ph. Clayton⁸², X. Zubiri⁸³, J. Ferrater Mora⁸⁴, J. L. Pinillos⁸⁵, and F. Cerdón⁸⁶, among others. However, we are only going to deal with the first group in order to shape the basic theories of the emergentist paradigm as related to the mental sphere and to the mind-body relationship.

The main issues in emergentism can be summarised as follows: dynamic and evolutionary interpretation of reality; similarity and specificity of emergent jumps; systemic or structural condition of the real; its special interpretation of the mind-body relationship; humanist motivation; ontological monism and epistemological pluralism; several explanatory or metaphysical proposals about the theory of emergence (emergence and transcendentalism). We will analyse these principles thoroughly and explain the ways different important philosophers interpret them.

1) *Dynamic and evolutionary unity of the cosmos*

All emergentists start from a dynamic and evolutionary understanding of reality. They believe the cosmos is intertwined with a dynamic process resulting from its own inner potential and from its capacity to give rise to something else. The emergentist sees reality not as a set of random things but as a homogeneous unified cosmos which, from the first explosion, has become more and more complex after many evolutionary stages. In short, it is a highly hierarchical world, which is made up of many levels of emergence. We have already pointed out that Morowitz distinguished up to 28 levels of emergence in this hierarchical

(London, 1982), 496-522; MONSERRAT, J., *Epistemología evolutiva y Teoría de la ciencia, o.c.*, 193-196.

⁸⁰ Cf. EDELMAN, G. M., *Neural Darwinism: The Theory Of Neuronal Group Selection* (Basic Books, 1987); ID., *Topobiology: An Introduction to Molecular Embriology* (Basic Books, 1988); ID., *Remembered Present: A Biological Theory of Consciousness* (Basic Books, 1989); ID., *Bright Air, Brilliant Fire: On the Matter of the Mind* (Basic Books, 1992); EDELMAN, G. M. - TONINO, G., *A Universe of Consciousness. How Matter becomes Imagination* (Trans.: *El universo de la conciencia. Cómo la materia se convierte en imaginación*, Barcelona, Crítica, 2002); SEARLE, J., *El misterio de la conciencia* (Barcelona, Paidós, 2000), ch. 3, «Gerald Edelman y la cartografía del reingreso», 45-56.

⁸¹ *La búsqueda científica del alma. Una revolucionaria hipótesis para el siglo XXI* (Madrid, Debate, 1995); SEARLE, J., *El misterio de la conciencia, o.c.*, ch. 2, «Francis Crick», 31-44.

⁸² CLAYTON, PH., *Mind and Emergence, from quantum to consciousness* (Oxford University Press, 2004); CLAYTON, PH. - DAVIES, PAUL, *The Reemergence of Emergence* (Oxford University Press, 2008).

⁸³ ZUBIRI, X., *Estructura dinámica de la realidad* (Madrid, Fundación Zubiri/Alianza, 1993). See exact information.

⁸⁴ FERRATER MORA, J., *De la materia a la razón* (Madrid, Alianza, 1979); ID., *Diccionario de Filosofía, o.c.*, words «Emergente», «Sistema» and «Sistémico».

⁸⁵ PINILLOS, J. L., *La mente humana* (Madrid, Salvat/Alianza, 1969; reedic.: Temas de Hoy, Madrid, 1991); ID., *Lo físico y lo mental: Boletín Informativo de la Fundación Juan March* (Madrid) 1978, issue 71, 3-31; ID., *Lo físico y lo mental en la ciencia contemporánea: Antropología y teología*, 1978, 15-44.

⁸⁶ CORDÓN, F., *Conversaciones con Faustino Cerdón, sobre biología evolucionista* (Barcelona, Península, 1981).

world. This unitary and dynamic interpretation of reality, from a physical, biological and psychical point of view, implies that we have to get rid of a determinist interpretation of the matter, which takes for granted that we live in a closed world that is subject to fixed determinist laws. Instead, we should interpret reality and matter, from its very infra-atomic dimension, as ruled by probabilistic laws and by the principle of non-determination as suggested by quantum mechanics and the theory of relativity. Therefore, we live in an open evolutionary world, which has a permanent capacity to give rise to something else and this world is open to ongoing innovations and emergences. That is, we live in a unitary, dynamic, complex world made up of different levels of reality with a hierarchical structure and totally intertwined (*respectivity*, Zubiri and Laín). This is what Clayton called *hierarchical complexity*, a hierarchically structured world. In this hierarchical reality, as we will explain later, each lower level is a condition of possibility of the upper level, since it is *dynamically subtended* (Zubiri), but the emergence of the upper level cannot be deduced from it because it always seems irreducible to the lower one.

2) *Similarity and specificity of emergent jumps*

It has already been said that there are many emergent jumps within reality. Therefore, if they are transversally analyzed, one can notice that they all have some common features, although they also show specific properties. The features that all emergent jumps have in common are the three following: novelty, unpredictability and irreducibility (Laín Entralgo), or, according to Popper, unpredictable, underivable novelty⁸⁷.

- *Novelty*: the resulting level is new as it has new properties. This novelty is what makes Laín think that the term *emergentism* is not suitable since the new level does not either *emerge* or *spring* but it *comes as ex novo*. However, it is not a whole radical reality because «the features corresponding to former evolutionary levels stay in it in dynamic subtension»⁸⁸. What is really new is the structure or system that has emerged *ex novo*, with its corresponding new properties.
- *Unpredictable*, «because even the most thorough knowledge of the previous level could not let us predict its appearance»⁸⁹. Therefore, here we have a type of *retrospective* rationality, never *prospective*⁹⁰, which is only discovered afterwards, and never predicted before it is produced.
- *Irreducible* to former levels, both in its ontological and epistemological dimension. However, not all emergentists accept the ontological novelty, although they do accept the epistemological one. For this reason, as we

⁸⁷ PPOPER, K. - ECCLES, J., *El yo y su cerebro*, o.c.

⁸⁸ LAÍN ENTRALGO, P., *El problema alma-cuerpo*, o.c., p. 27.

⁸⁹ *Ibidem*, p. 27.

⁹⁰ Terms used by GARCÍA BACCA, J. D., *Curso sistemático de filosofía actual* (Caracas, UCV, 1969), p. 169 ff.

have already pointed out, there is a difference between *strong* emergence (which admits ontological novelty) and *weak* novelty (which admits epistemological novelty). The epistemological irreducibility takes for granted that the emergent level is ruled by new laws, which result in specific knowledge that cannot be reduced to the knowledge of the previous level.

However, although all emergent jumps have these common qualities, each emergence is specific and has its own special features since the systematisation that appears and its properties imply a novelty. That is why the biological emergence is different from the physical one and the mental emergence is different from the biological. Nevertheless, this novelty within emergent jumps does not mean that we are referring to miraculous or supernatural phenomena. J. Searle refers to this suspicious interpretation of emergentism when he talks about a conversation with J. Putnam at a conference at New York University about the philosophy of mind. Putnam regarded Searle's approach as *dualism of properties, emergentism* and *supervenience*. Searle agrees with the term *emergentism*, but with some reservations since «traditionally it has been considered that emergentism implies something mysterious, where there is a mysterious process that is not physical and that process produces a peculiar property. In short, emergentism tends to share the most mysterious aspects of dualism»⁹¹. These preconceptions have contributed to the discrimination against the emergentist model and its proponents so in many handbooks of *Philosophy of mind* this approach is not even mentioned⁹² and it seems that the only theories that are worth mentioning are the ones that share the premises of logical empiricism and analytic philosophy, which are close to some type of physicalism and to the predominant epistemological reductionism.

3) *Systemic or structural condition of the real. The whole is more than the sum of its constituents*

Everything that exists is made up of systems or structures and it is important to distinguish a double level within each system: the whole and the parts. As Bunge suggests, a system is «something made up of parts that are not interdependent; on the contrary, they are interconnected»⁹³. Nonetheless, there is only a real system when this system has a specific property that is different from its constituent parts. This property is called emergent, as opposed to resultant properties, which are typical from the parts⁹⁴. Laín Entralgo bases his structuralism on Zubiri's concept

⁹¹ SEARLE, J., «Mentes y cerebros sin programas», in RABOSI, E. (comp.), *Filosofía de la mente y ciencia cognitiva*, o.c., 413-443; 438.

⁹² For example PRIEST, S., *Teorías y filosofías de la mente*, o.c.; MOYA, C., *Filosofía de la mente* (Valencia, Universitat de València, 2004). We can see this lack in many other current handbooks.

⁹³ BUNGE, M., *El problema mente-cuerpo. Un enfoque psicobiológico*, o.c., 52. Cf. ID., *Epistemología*, o.c., pp. 101-110; 119-121.

⁹⁴ BUNGE, M., *Epistemología*, o.c., 119-121; ID., *Materialismo y ciencia*, o.c., pp. 39-44.

of substantive structure, for whom all substantivity is a set of notes that form a closed, respective structure which has entitative sufficiency to exist. The same as in Bunge's systemic conception, Zubiri's and Laín's structuralism distinguishes between the whole, with *structural* properties, and the constituents, with *additive* properties. When the constituents become part of a structure, they do not lose their properties but they integrate into the whole as its own support and this is known as «dynamic subtension»⁹⁵. However, «structural properties are essentially irreducible to the sum or combination of the properties of each of the elements that make up that structure». Hence, «the agent subject of the structural properties is, in short, the unity of the structure as a set»⁹⁶. Searle⁹⁷ and Monserrat⁹⁸ also support a similar approach.

When this theory is applied to the mind, emergentists define the mind as the structure or the system of the brain or of the whole human being. Bunge distinguishes three ways to understand the way the brain works: *neuronism*, *holism* and *systemism*. *Neuronism* believes that the key feature in the way the brain works is the neuron and it considers that the brain is just the sum of many neurons. *Holism* gives the opposite view and supports the idea that the brain works as a whole and in a systemic way. However, *systemism* believes that the brain works in a complex way and while for some activities a few neurons are enough, for others you need more complex groups of neurons or even the whole brain⁹⁹. It is only in this last case when we can actually speak of *mind*. Therefore, isolated neurons do not think and the subject of thought is the whole brain system.

This idea of the mind as the brain system does not only refer to the brain but to the whole human body as the brain is nothing on its own outside the scope of the complete structure of the human reality. For this reason nowadays we prefer to talk about the mind-body relationship rather than mind-brain, understanding the mind or psyche as the «set of structural properties of its living body»¹⁰⁰, or «the dynamic structure of human reality»¹⁰¹.

4) *Special way to solve and understand the problem of the mind-body relationship*

As we have already mentioned before, emergentism stands between dualism and behaviourists and reductionist materialists. In fact, behaviourists solve the problem as they eliminate one of the parts, that is, the mind; reductionist materialists reduce the mind to the way the brain works from a physiological

⁹⁵ LAÍN ENTRALGO, P., «El problema alma-cuerpo en el pensamiento actual», en MORA, F. (ed.), *El problema cerebro-mente, o.c.*, p. 24.

⁹⁶ *Ibidem*, p. 25.

⁹⁷ SEARLE, J., «Mentes y cerebros sin programas», in RABOSI, E. (comp.), *Filosofía de la mente y ciencia cognitiva, o.c.*, 413-442; 430.

⁹⁸ MONSERRAT, J., *Epistemología Evolutiva y Teoría de la Ciencia, o.c.*, p. 173.

⁹⁹ BUNGE, M., *El problema mente-cerebro, o.c.*, pp. 58 y ss.

¹⁰⁰ LAÍN ENTRALGO, P., *El problema alma-cuerpo, o.c.*, p. 29.

¹⁰¹ *Id.*, *Cuerpo y alma. Estructura dinámica del cuerpo humano, o.c.*

point of view. On the contrary, dualists have problems to explain the mind-body interaction since they understand them as two different ontological substances. However, emergentists interpret this mind-body relationship as the relation between the whole and its parts, the system and its constituents. That is the way M. Bunge understands it although he does not hide the difficulties he has to explain how this relationship works as one thing is to suggest an explanatory model but to understand it completely is a totally different matter¹⁰². Searle understands this problem as the best solution to the hiatus between intentionalist psychology and neurophysiology¹⁰³. There is a relationship between the whole brain system and its different parts and we should understand this relationship as cause-effect like the interconnection between the macro and micro level of the brain reality and not in a dualist sense as two different ontological realities. Therefore, mental qualities are *caused by* the micro level and *performed in* the macro level¹⁰⁴.

One of the main aims of both neuroscientists and philosophers nowadays is to understand how the emergent jump of the mind takes place, from the conscious self and from subjectivity, as a consequence of the evolutionary complexification of the mind from prehuman species to humanity¹⁰⁵.

What is very clear for emergentists is that the interaction between mind (system) and body goes both upwards (from the brain or central nervous system to the mind) and downwards (from the mind to the brain or the whole body), as opposed to *epiphenomenism*, which only accepts interaction from bottom to top. However, we are still very far from discovering the exact mechanism of this interaction. Following the advances in neuroscience, J. Monserrat has written some articles¹⁰⁶ about the way the brain has organised itself and about how it has become more complex. The millions of neurons that make up the brain have joined and interacted with each other (synapsis) in order to form relational webs called *neuronal engrams*¹⁰⁷, although they have also been called *neuronal loop*, *neuronal structure* or *neuronal subsystem*¹⁰⁸. Some are inborn while others are made up as a consequence of our interaction with the ecological and interhuman surroundings¹⁰⁹. *Engrams* are responsible for gaining experience and it is

¹⁰² BUNGE, M., *Materialismo y ciencia, o.c.*, 119 ff.; Id., *Epistemología, o.c.*, 140 ff.; Id., *El problema mente-cerebro, o.c.*, 84 ff., and 101-106.

¹⁰³ SEARLE, J., *Libertad y neurobiología, o.c.*, pp. 413-414.

¹⁰⁴ Id., «Mentes y cerebros sin programas», *o.c.*, 431-432.

¹⁰⁵ SEARLE, J., *El misterio de la conciencia, o.c.*, where he shows the approaches of Crick, Penrose, and Edelman, among others.

¹⁰⁶ MONSERRAT, J., *La percepción visual. La arquitectura del psiquismo desde el enfoque de la percepción visual* (Madrid, Biblioteca Nueva, 1998); Id., *Engramas neuronales y teoría de la mente: Pensamiento* 57 (2001), issue 218, 177-211.

¹⁰⁷ «According to Monserrat, an engram is a structure of neural interconnection in the brain which is caused by the spread of chemical, electrical nerve impulses (synaptically transmitted) that originate in the endings of the central nervous system»: «Engramas neuronales y teoría de la mente», *o.c.*, 186.

¹⁰⁸ Id., *Engramas neuronales y teoría de la mente, o.c.*, 185.

¹⁰⁹ *Ibidem*, 198-199.

reasonable to think that this is the place or brain infrastructure where *qualia* or subjective experience is located. Isolated *engrams* are probably not responsible for this and it is interconnected *engrams* that are able to achieve this as they become the «neuronal support of engrams, end producers of conscience»¹¹⁰. Whatever the mechanism is, we still do not know the basics about the way the brain works and to solve the question of how and «why psychism emerges from neuronal structures»¹¹¹ is currently one of the most interesting issues in neuroscientific and philosophical research.

The two main strategies that are currently being followed in order to solve these key points are, using Montserrat's terms, the approaches of *classical-macroscopic neurology* and *quantum-microphysics neurology*. While the former focuses on the level of neurons and their synaptic interaction, the latter concentrates on lower levels, on basic particles, where certain quantum phenomena take place, which will lead us to place the emergence of the qualitative experiences of conscience right there¹¹². To this respect, Monserrat follows R. Penrose¹¹³, one of the most outstanding authors, undertaking this kind of research. Penrose focuses on the so-called *microtubules* which make up the structure of neurons where the quoted quantum phenomena take place, which will result in the emergence of the states of subjective conscience. Although many authors, like J. Searle, consider these proposals a fantasy and very difficult to prove¹¹⁴, Monserrat feels more optimistic about this approach and thinks that this may be a plausible theory and it may enable us to find new types of research although he is also aware of the fact that it is a complex hypothesis because for the moment it is very difficult to put the experiments that prove it into practice¹¹⁵.

In spite of this controversy, one of the key factors in the emergentist theory of the mind or conscience is the fact that it is a structure. The main problem is to decide which ontological status a reality like a system or a structure corresponds to.

¹¹⁰ Ibidem, 189.

¹¹¹ Ibidem, 190.

¹¹² Ibidem, 191-195.

¹¹³ PENROSE, R., *The Emperor's New Mind: Concerning Computers, Minds, and the Law of Physics* (Oxford University Press, 1989; Spanish translation: *La nueva mente del emperador*, Barcelona, Grijalbo, 1996); ID., *Shadows of the Mind: A Search for the Missing Science of Consciousness* (Oxford University Press, 1994; Spanish translation: *Las sombras de la mente*, Barcelona, Grijalbo, 1996); ID., *The Large, the Small and the Human Mind* (Cambridge University Press, 1997; Spanish translation: *Lo grande, lo pequeño y la mente humana*, Madrid, Cambridge University Press, 1999); SEARLE, J., *El misterio de la conciencia, o.c.*, ch. 4, «Penrose, Kurt Gödel y los citoesqueletos», 57-91; MONSERRAT, J., *Penrose y la mente computacional: Pensamiento 55* (1999) 177-216; ID., *Penrose y el enigma cuántico de la conciencia: Pensamiento 56* (2000) 177-208; ID., *John Searle en la discusión sobre la conciencia, o.c.*

¹¹⁴ SEARLE, J., *El misterio de la conciencia, o.c.*, ch. 4, pp. 57 ff; ID., «¿Es la mente un programa informático?», en *Investigación y Ciencia*, 1990, n.º 162, 10-17.

¹¹⁵ MONSERRAT, J., *Engramas neuronales y teoría de la mente, o.c.*, 193-194.

5) *Ontological Monism and epistemologic pluralism*

All emergentists are epistemological or methodological non-reductionists but not ontological non-reductionists. The dynamic condition of reality makes us take the evolutionary process and the emergence of new realities seriously. However, those realities are not ontologically different from what we have, but they would really be new properties, which result from a new systematization or structure of the material or living reality. Each level of reality has its own specific laws so the sciences that study them (physics, chemistry, biology or psychology, among others) are autonomous and irreducible to former disciplines. However, not all emergentists agree with respect to the ontological nature of reality. For Bunge, everything that is *real* is also *material*, although not everything is physical and not everything can be studied with the help of physics. Therefore, to him, each level of complexity of reality has to be studied with the right discipline, which is irreducible to the lower level. That is why he calls his approach *monism of substances and dualism of properties* (physical or psychical)¹¹⁶. Therefore, Bunge believes that only materialist ontology «blends in with contemporary science»¹¹⁷. Nonetheless, Popper starts from a more open concept of reality and he believes that the «real» is not just made up of material and physical aspects but of all types of entities that «can act in a causal way or interact with ordinary real material things»¹¹⁸. For Popper intellectual theories (world 3) and the mind or self (world 2) are as real as the physical real world (world 1). Therefore, his approach accepts both an ontic and an epistemological pluralism. Loyal to his critical rationalism though he is, he says that he does not like questions such as *what is it?*, due to the fact that, to his mind, these questions are empty. Science has to concentrate on describing things as they are and on how things emerge but it should not attempt to find out their deep essence. Concerning emergentism, Popper believes that science and philosophy can only verify and describe emergent jumps but they could never explain how and why those new jumps have emerged. Hence, Popper states that «I would like to stress how little we are told when it is said that the mind is a product that emerges from the brain. Basically, this statement lacks any meaning and it is just like putting a question mark in a specific place in the evolutionary process»¹¹⁹. For this reason, in a humble way and from the point of view of epistemological realism, Popper considers that «almost everything that is important should remain unexplained»¹²⁰. However, Searle is closer to Bunge in his approach as he believes that mental phenomena are just a set of brain properties and he calls this approach *biological naturalism*. Thus, his ontology is *materialistic*, but it does not reduce mental phenomena to the sheer

¹¹⁶ BUNGE, M., *Materialismo y ciencia, o.c.*, 28 and ff; 34 and ff.

¹¹⁷ *Ibidem*, p. 29.

¹¹⁸ POPPER, K., *El yo y su cerebro, o.c.*, p. 11.

¹¹⁹ *Ibidem*, 622; Cf. also 629, 634; *Id.*, *Conocimiento objetivo* (Madrid, Tecnos, 1974), 73, 223 ff; 236ff.

¹²⁰ POPPER, K., *El yo y su cerebro, o.c.*, 622.

physiological work of neurons because he believes that mental properties are the result of the systemic and global work of the brain. His approach could be called substance monism and *property polyism*¹²¹. Monserrat also defines his approach as *monism*, but he understands his materialism is open and not reductionist. Advances in current physics (relativity and quantum theory) have made us aware of the fact that the classical concept of matter is no longer valid in the sense that it is «still a *black box* or *black object* whose inner structure has not been unveiled yet. Physical reality is still an enigma or open question»¹²². Laín Entralgo expresses this idea in similar terms when he talks about the ontological status of a structure, as he calls the mind or psyche. Following his predecessor Zubiri, Entralgo refers to himself as *matterist* or *open materialist*. Not everything is matter but the problem is how to describe the mind within an old-fashioned ontology which only knows how to classify things either as matter or as spirit. The human mind is neither one nor the other. Therefore, in order to solve this problem, he aims at creating a renewed metaphysics which accepts a description of reality in a more pluralist way and not only reduced to the matter-spirit dilemma. As Laín suggests, «as long as the human mind does not invent other concepts to access «the real», the reality that gives its essential and operative unity to a physical structure will not stop being enigmatic»¹²³. For Laín, this fact of considering the mind an *enigmatic* reality does not mean that we have a vague and comfortable attitude towards the unknown. On the contrary, it means that beyond any scientific or philosophical answers, the more complex realities, such as the one about the ontological status of the human psyche or the question about the human essence, there will always be problems that overwhelm us and which are beyond us¹²⁴. For Laín an *enigma* is the expression of all physical structures and the very emergent or constitutive process of a new structure. For this same reason, we should consider the emergence or constitutive process of human reality as *enigmatic* reality. Searle shows the same approach to the wonders of emergence when he interprets such phenomena as *mystery*. Even though he refers to his theory about the mind as *biological naturalism*, this does not mean that «we should miss our perception about the mystery of nature». However, for Searle, this mysterious uncertainty does not lie in the description of its natural work but in the deep philosophical or even religious sense that it may have or we may even give to it. To this respect, the way the mind works would be, for Searle, as natural and *mysterious* as any other phenomena in *nature*, like «the existence of gravitational strength, the photosynthetic process or the size of the Milky Way»¹²⁵.

¹²¹ SEARLE, J., *Mentes y cerebros sin programas*, o.c., 438.

¹²² MONSERRAT, J., *Epistemología evolutiva*, o.c., 164.

¹²³ LAÍN ENTRALGO, P., *El problema alma-cuerpo*, o.c., 25.

¹²⁴ Laín defines *enigma* as «the reality of what cannot possibly be understood from a personal, situational and human point of view»: *Ibidem*, 25.

¹²⁵ *Mentes y cerebro si programas*, o.c., 435.

6) *Humanist Motivation*

These last reasonings of Laín and Searle about the enigma and mystery of reality are clear evidence of their open mind and their non-reductionist approach to reality. In the context of this dynamic and evolutionary world, human reality has emerged as the central climax of this wonderful cosmos. The human being is shown as the combination of continuation and rupture from the rest of the cosmos, that is, as the result of the evolution of the dynamic process of the biosphere but also as the outcome of an emergent jump which, from a qualitative point of view, breaks the object from which it emerges and at the same time it receives an ethical and ontological density which makes the human being a special reality that is particularly valuable. Hence, all the writers that we are analysing openly talk about their clearly humanist and anthropocentrist tendency when they defend their attitude towards philosophy of mind and their understanding of the human being within that philosophy. In his prologue to *The self and its brain* Popper clearly states his humanist motivation when writing this book since he shows his concern about the growing popularity of physicalist materialism and the negative consequences that this has regarding the reduction of the human being to just another object in our ecological environment. That is why he claims that «the demythification of man has gone too far»¹²⁶, so we should keep on reaffirming the Kantian humanist thesis about the ontological value of the human being and his ethical dignity because he has a distinctive feature which makes him stand out from the rest of the intramundane reality: the self-conscious mind. Bunge is very close to that approach although he is not so radical. He considers his materialism to be *humanist*¹²⁷, because he does not reduce the human being to a simple machine but he supports the ontological difference between man and other animals and, strictly speaking, he is also against the theories in *Artificial Intelligence*. Bunge firmly believes that only human beings can be creative, self-conscious, free and responsible (ethical beings), creators of culture and we are «neither a machine that can be programmed nor an animal that can be easily influenced»; on the contrary, we are the only animal that is absolutely creative and full of potential powers¹²⁸. The human being is «the only animal that is able to invent myths and theories and the only one that can discuss them or come up with new behavioural patterns and rise up against others»¹²⁹. Searle is also a very well-known proponent of the radical and qualitative difference between the human mind and the «mind» of intelligent machines, as he suggests in his famous *Chinese Room* argument¹³⁰. If we want to support the fact that computer programs are real languages, we should realise that the only

¹²⁶ *El yo y su cerebro, o.c.*, pp. 3-5.

¹²⁷ In *Materialismo y ciencia, o.c.*, p. 27, Bunge states that «consequent materialism is, therefore, humanist».

¹²⁸ *El problema mente-cerebro, o.c.*, 169, 182-185, 186, 201, 205, 207, 218-220.

¹²⁹ *Ibidem*, 184-185.

¹³⁰ SEARLE, J., *Mentes, cerebros y ciencia, o.c.*, ch. 2, pp. 33-48; *Id.*, «¿Es la mente un programa informático?», en *Investigación y Ciencia*, 1990, issue 162, 10-17.

thing they have is the *syntactic* aspect, not the *semantic* one, which belongs exclusively to the human mind. However, in later writings¹³¹, he considers that computers do not have this syntactic aspect in their so-called languages because strictly speaking there can only be language when we have self-conscious minds, which provide a syntactic relationship between words. Thus, as explained above, it is not strange for him to consider emergent jumps *mysterious* especially when considering mental emergence. He refers to J. Monserrat's approach as *humanist emergentist monism*¹³², in the sense that he considers the human being both an evolutionary reality and an entity that has an original distinctive feature that lies especially in the mental aspect. Therefore, the human being shows a *continuity* with the physical and biological reality and also a *qualitative rupture*, which is mainly due to the self-conscious mind and all it involves about creativity, freedom, responsibility and openness to questions about the deep sense of everything. Hence, the human being is, like all other living creatures «biologically organized matter»¹³³ but it is this specific organization of the mind that makes the human being stand at a different level above all the other living creatures. Laín Entralgo expresses himself in similar terms since the humanist thesis is one of the main issues that supports all his anthropologist approach. Obviously, he finds a clear ontological and ethical difference between man and all other living species because, following Zubiri, the *formality of reality* of the human species sets man a step above the sheer formality of stimulatory that all other animals have. Hence the human being is not only *of its own* (*de suyo*) like any other substantivity, but it is also *its own* (*suyo*) in a reduplicative way. This means that the set of notes that make up its basic structure is not a closed essence but an open one. Thus, man is in charge of its own reality and he has to fulfill himself (*personality and personalty*) taking hold of the different possibilities that reality offers him (ethical capacity). Laín also combines harmoniously the closeness and continuity of the human species and all other animals and at the same time the difference and the qualitative jump. This is clearly seen in the way humans are and act because we are a unique substantive structure that is made up of two substructures: body and psyche. This unity is shown in the concept of *habitude* or specific way the human being faces reality: his acts are unitary and they have sensitivity and intelligence (sentient intelligence or intellective sensing). An animal feels but, apart from feeling, the human being also has the so-called «intellective knowing», which means that the human being «knows» with sentient intelligence. That is why he is not in favour of artificial intelligence in a strict sense because the concept of intelligence belongs neither to animals nor to machines. Intelligence belongs only to human beings in the sense that only humans can sense reality or have the formality of reality¹³⁴.

¹³¹ «¿Es la mente un programa informático?», *o.c.*

¹³² *Epistemología Evolutiva, o.c.*, p. 170.

¹³³ *Ibidem*, 167.

¹³⁴ LAÍN ENTRALGO, P., *Qué es el hombre. Evolución y sentido de la vida* (Oviedo, Ediciones Nobel, 1999); *Id.*, *El problema alma-cuerpo en el pensamiento actual, o.c.*

5. UNSETTLED QUESTIONS WITHIN THE SYSTEMIC EMERGENTIST APPROACH

Undoubtedly, emergentism is nowadays the best approach to describe both the dynamic structure of reality and the way the mind works and its origins, unlike other alternative models such as reductionist materialism, functionalism and dualism. However, this does not mean that we should consider systemic emergentism the perfect theory. There is nothing further than that in our way of understanding things. Hence, we consider it necessary to finish these pages with some critical reflections on some limitations within the emergentist paradigm and we would like to raise some questions about this approach.

The main weakness arises from the fact that it comes as a sheer theoretical hypothesis, as a clarifying model of what the mind is and how it works but this model has to be completed and proved by advances in neuroscientific research. In fact, all theories begin as outlines that should be tested both from a scientific and philosophical point of view, although in a different way and to a different extent. In the case of emergentism, we still have to prove its effectiveness to provide answers to the way the brain works and to see if the main argument in systemic or structuralist emergentism is able to prove that it is coherent to distinguish between the properties or functions of the global system and those of neurons and the different brain subsystems. On top of that, there is another question that still remains unsolved: we still have to solve how brain sciences can overcome the problem of the emergence of self-consciousness and all other specific properties of the human mind once we understand the complex way the brain works. This is what Searle called the *hiatus* between the objective look and the subjective or conscious one. These unsolved questions do not undermine the emergentist approach because this is an unavoidable condition of every philosophical theory. However, it is important to realize this in order to become aware of the temporary character of all theories and of their need to be revised and empirically contrasted in the future by applying the latest scientific breakthroughs to them. Only then will we be able to see if the thorough knowledge of the way the brain works is enough to explain the fact and the emergence of conscience in order to close the *hiatus*, or if, on the contrary, it will keep on being an *enigma*, as Laín claims, or one of the permanent *mysteries* of human reality (Searle).

One of the main arguments against the essence of the emergentist thesis and a problem which we have already referred to several times, is the question about the capacity of the emergentist thesis to explain the appearance of the self-conscious mind through emergence. Popper, Laín, and also Monserrat are those that more strongly insist on the need to distinguish between the sheer *statement* of the fact of emergence and the attempt to *explain* that fact. The only thing that science does is to state this fact but it fails to provide a deeper explanation because one thing is to be able to state that a qualitative novelty has taken place but to be able to explain the reasons why that has happened is a completely different matter. This explanatory reasoning does not belong to philosophy but there are

many philosophical suggestions which range from sheer chance to the fact of considering divine intervention as the basis of the world, which does not stand at the same level as physical reasons¹³⁵. The emergentist thesis can be understood at both levels: as a descriptive statement or as an explanatory proposal. The former would just state that there has been a qualitative jump in the evolutionary process between the biological level and the mental one, which consists of a new systematization of reality, the mind resulting in a new dynamic structure of reality, that is, the human reality. The statement of such novelty could be seen in the complexity of the human brain and above all in the complex nature of human actions (its behavioural structure).

However, regarding the explanatory proposal, philosophy wonders why there has been such a jump and it aims at providing an explanation. In Zubiri's terms, it would try to explain how biological matter has given rise to the mental aspect in the sense that it does not seem likely that biology can *by itself* give rise to what has emerged *of itself*. However, when tackling this issue, we enter the field of metaphysics and religion where a wide range of explanations are acceptable. As we saw in the presentation of the approaches of some of the writers we have mentioned, the thesis of systemic or structural emergentism can be set against many different backgrounds or combined with metaphysical and anthropological views, which complement the paradigm in an essential way and at the same time this makes us aware of the fact that the same theoretical model in philosophy of mind can be complemented with a wide range of very different metaphysical proposals. Bunge's materialist monism is not the same as Searle's biological naturalism, Popper's proposal about world 3 or Monserrat's and Laín's approach, who are proponents of transcendental metaphysical proposals.

With regards to this question, Ph. Clayton classifies emergentist writers according to four different metaphysical parameters: physicalist emergence, contingent emergence, necessary emergence and emergence open to the existence of an intelligent, transcendental being, and it is this last point that he focuses his approach on¹³⁶. However, proponents of this last approach should try to provide a convincing model of God's acts in the world, which should be above the image of God as a miracle-worker who provides only short-term answers. This should be in agreement with an independent view of the world and of the acts of human beings and it should place God's acts not at the level that medievals called second causes but within the realm of the fundamental aspect of all reality. This fundamental God would be the one that creates and sustains the universe in its ongoing and evolutionary «giving», by talking to it, respecting its laws and letting its mundane potentiality shed light into the galaxies, planets, their life, the different

¹³⁵ About the different attitudes towards the relationship between science, philosophy and theology and about the different ways to understand God's acts in the world, see BARBOUR, I. G., *Religión y ciencia* (Madrid, Trotta, 2004); MONSERRAT, J., *Ciencia, filosofía del proceso y Dios en Ian G. Barbour*: Pensamiento 60 (2004), issue 226, 33-66.

¹³⁶ See CLAYTON, PH., *Mind and Emergence. From quantum to consciousness* (Oxford University Press, 2004).

living creatures and the emergence of the human being with a free, self-conscious mind¹³⁷. It is a God that lowers himself to allow the world and the human beings in it to be and to develop according to their own potential and free decisions¹³⁸.

Furthermore, there is still another aspect that I would like to emphasize and it is the one about the implications of the close relationship between the global approach to systemic emergentism and the different anthropological models each of its versions relies on. The different approaches to the mind and the mind-body relationship usually look at this problem from two radically different points of view called *first person* (introspection) and *third person* (objective approach). Each has shown both its strengths and its weaknesses. Thus, today some writers are trying to overcome those weaknesses suggesting an approach that is above those points of view. In fact, to some extent, emergentism or at least some emergentist writers aim at tackling this problem. Searle talks about this objective in some of his writings. However, I consider that he is just becoming aware of the problem and he would like to solve it but he does not achieve any satisfactory results. To my mind, in this sense the most satisfactory solution is the one provided by an approach called *second person*¹³⁹, or also by other approaches that focus on the study of *action*¹⁴⁰, as this is where the objective dimension and the intentionality of the subject get together. The advantage of these proposals, as opposed to introspective or objective approaches, does not only lie in the fact of completing the strengths of both points of view by improving their weaknesses but, on the contrary, it attempts to provide a solution high above the individualist anthropological model that both of them suggest. Both the introspective and objective points of view start from the assumption that the mind is a reality that belongs to an isolated self-sufficient being whatever the best perspective may be to access the mind. Nevertheless, the second person perspective and the action approach consider the mental aspect an interpersonal social structure so the way to access the mind has to be by means of the dynamism of interpersonality. The mind and mental states are created, grow and are expressed in the context of interpersonal relationships and it is only from this point of view that we will be able to justify them¹⁴¹.

¹³⁷ See BARBOUR, I. G., *Religión y ciencia* (Madrid, Trotta, 2004); ID., *El encuentro entre ciencia y religión. ¿Rivales, desconocidas, o compañeras de viaje?* (Santander, Sal Terrae, 2004); POKINGHORNE, J., *Ciencia y Teología. Una introducción* (Santander, Sal Terrae, 2000); SCHMITZ-MOORMANN, KARL (together with James F. Salmon, S.J.), *Teología de la creación en un mundo en evolución* (Estella, Verbo Divino, 1997); SOLER GIL, F. J. (ed.), *Dios y las cosmologías modernas* (Madrid, BAC, 2005); EDWARDS, DENIS, *El Dios de la evolución. Una teología trinitaria* (Santander, Sal Terrae, 2006).

¹³⁸ See BARBOUR, I. G., *El encuentro entre ciencia y religión, o.c.*, pp. 238 ff.

¹³⁹ See GOMILA, A., «La perspectiva de segunda persona: mecanismos mentales de la intersubjetividad», in MARTÍNEZ-FREIRE, P. (ed.), *Filosofía actual de la mente* (Contrastes, Suplemento 6, Valencia, 2001), 65-86.

¹⁴⁰ See RICOEUR, P., *Sí mismo como otro* (Madrid, Siglo XXI, 1996); ID., *El discurso de la acción* (Madrid, Cátedra, 1988).

¹⁴¹ Cf. For a way of dealing with this approach see TUOMELA, RAIMO, «Intención conjunta y colectiva», in MARTÍNEZ-FREIRE, P. (ed.), *Filosofía actual de la mente, o.c.*, 105-150.

In this sense, we may wonder if the emergentist model owes too much to the two traditional alternative approaches (first or third person), although it is aware of its weaknesses but fails to complete its interesting contribution with an anthropological approach that may consider the mind and mental phenomena as a reality that emerges, matures, develops and expresses itself in its unavoidable interpersonal and social contexts, as is shown by the psychological and anthropological research into the study of the development of human personality. We believe that the *systemic emergentist* model would considerably benefit from these new theories, which would force it to enrich its main thesis with an anthropological approach with interpersonal and social connotations. By doing so, we would achieve the systemic or structuralist character we want in the emergentist model in its deepest sense because the system or structure would not apply only to the mind or the individual but also to the group or social character.

In conclusion, for the human mind to be made up as such, we consider that three complementary elements or dimensions should be taken into account: the *evolutionary* aspect (the biological maturing process of the brain, which represents the jump from prehuman to human existence); the *systemic* aspect (the systemic way to understand the mind as the total structure of the brain); and the *social* aspect (the interpersonal and social dimension as the field where the mind and the person originate). It is only within the context of human society that each personal reality can be shaped as such. Thus, this proposal could be referred to as *psycho-social-systemic emergentism*. In short, these arguments show the close and unavoidable relationship between each proposal within the philosophy of mind and the corresponding anthropological model that, consciously or unconsciously, explicitly or implicitly, it relies on.

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