

Neutral Monism on Minds, Brains, and Machines[†]

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Summary: Leibniz's famous windmill metaphor posed a problem that much later Levine called the "explanatory gap," referring to the apparent disjunction between the mental and material aspects of reality. Neutral monism, in this respect, reveals itself to be a worthy rival to materialist monism, accepting the irreducible subjectivity of qualia. This thesis somehow separates psychology from physics and, if we add an additional hypothesis to it, banishes the possibility of thinking machines.

Keywords: Mind, matter, neutral monism, materialism, qualia

1. Introduction

Levine's classic article on the difficulty of deriving our most intimate subjective experiences from the available knowledge about the material basis of brain processes, published four decades ago, marked a milestone in its field and brought forth the expression "explanatory gap". Not for introducing substantial innovations but for the sharpness of its arguments, that text has become since a reference for all authors interested in the mind-matter relationship. For the purposes of this work, we will accept a definition of "mind" –regarded as equivalent to "consciousness"– as «[...] the self-transparent dimension of psychic life, by virtue of which the thinking subject becomes an active spectator of himself, [...]» (Arana, 2015: 19). On the other hand, for "matter" it would be appropriate "[...] an open concept that designates without further specification any entity that is immersed in space-time and complies with natural laws [...]" (Ibid: 20).

The terms of the problem have hardly changed since that celebrated article was published; the other way round, nowadays its edges are put forwards, numerous and sharp, although its thematic core remains intact. There remains as pertinent today as always to address the same questions that Levine left open: what is the link between the material and mental dimensions of reality? Are they mutually incommensurable? Or is that apparent categorical abyss between both of them due only to our biases and prejudices? The issue was further muddied by the advent of computers and so-called *Artificial Intelligence*, since this new world suggested the possibility that electronic systems of sufficient complexity could develop some form of consciousness comparable to human mind.

The core of this matter, in different disguises, always revolves around the apparently insurmountable fissure between mind and matter. The attempts to prop up a unified image of the world beyond this dilemma have been numerous and controversial,

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with derivations that continue to our present time. The following sections, starting from the considerations made from Leibniz up to Levine's contemporary comments, will confront the two main types of monism –materialist and neutral– whose vision is closer to firmly established scientific knowledge, with special emphasis on neutral monism, less widespread than its materialist counterpart.

An essential part of our discussion will be on the nature of *qualia*, a very special and irreplaceable component in the architecture of reality that we cannot do without if we want minds to play a role in it. This point, in turn, will lead us to wonder whether it is possible to attribute mental phenomena to electromechanical entities, such as the advanced computers and automata that future technology promises us. And in relation to this, a possible formulation of the ever-controversial links between sciences such as physics and psychology will be exposed, set aside the exciting question of consciousness –and self-awareness– whose extension exceeds the limits of this paper. The conclusions section will put an end to this exposition with a brief summary of the most relevant theses defended here.

2. From Leibniz to Levine

A few authors would doubt that the touchstone in the construction of one's own identity is fundamentally given by the distinction between the intimacy of our own self and the existence of an external world that is omnipresent, incontestable and always alien to human desires. Our thoughts, desires and fears –our mind, after all– remain outside the cold impassiveness of the material world, as overwhelming as inescapable, that surrounds us. Other than the sad exception of serious mental disorders, anyone is aware of the exhaustive disjunction between our mental life and the material events of the environment. From such a privileged point of view, human beings involve ourselves with exploring the whole universe towards the realms of the dazzlingly large and the unimaginably small. The natural sciences, and even social sciences, proved to be fully successful in these matters. But there was still a receptacle to conquer, which was our own self. There, in the very roots of our inner universe, perhaps resided the answer to the unknown of the essence, the existence and –why not– the transcendence of the human being.

But the endeavour turned out to be unexpectedly arduous, far surpassing the intellectual struggle that led to the discovery of Newton's laws or Darwinian evolution. There seemed to be something radically different about the mental world that cut it off from the material aspects of reality. It was not enough to abandon the appeals to an immaterial soul and focus the investigations on the brain, an indispensable requirement to discover how far one could go along this path in the naturalistic explanation of our psychological foundations. The border between mind and matter persisted, invisible and impenetrable, resisting all efforts to cross it. The great Leibniz was one of the earliest authors who diaphanously pointed out the core of the problem with his celebrated metaphor of the mill:

«We must confess that perception, and what depends upon it, is inexplicable in terms of mechanical reasons, that is through shapes, size, and motions. If we imagine a machine whose structure makes it think, sense, and have perceptions, we could conceive it enlarged, keeping the same proportions, so that we could enter into it, as one enters a mill. Assuming that, when inspecting its interior, we will find only parts that push one another, and we will never find anything to explain a perception. [...]»
(Leibnitz, 1989)

This is what has been known as the "Leibniz's gap" that placed the core issue of the mind-matter dilemma in the center of the stage. In other words, that we face an apparently insurmountable abyss between the objective (material) and the subjective (mental) dimensions of existence. On the one hand, from a purely material perspective we only have access to the objective aspects of reality (measurable properties, changes of state), through which we try to reveal the basic structural features of the physical world. At the opposite extreme, apparently, there stands our internal subjectivity, by virtue of which we not only compose the abstract theories that represent the material universe, but are also dragged by a never-ending flow of memories, thoughts and emotions of all kinds.

It is of great importance to underline that the dichotomy pointed out by Leibniz poses a challenge for both dualists and monists. Those who defend that mind and brain are two separate entities will have to explain the way in which they interact, unless they abandon themselves to a kind of pre-established harmony or psychophysical parallelism –a much too contrived escape to be taken seriously. And those who advocate monism will have to justify the scandalous disparity between the material and the mental planes that we take for granted in all our descriptions of the world.

With the addition of some formal sophistication, analogous arguments were advanced many years later by Saul Kripke, Thomas Nagel, Frank Jackson, Joseph Levine, and David J. Chalmers in their famous studies on this very subject. Kripke (1971, 1979, 1980) developed a much more sophisticated version of the Cartesian argument for a well-founded distinction between mind and brain. Relying on the semantics of possible worlds and on his theory of direct reference for linguistic terms, this philosopher concluded that mental states did not necessarily have to be identified with physical states in that delicate piece of matter that we call brain. The central argument held that, for example, the physical concept of heat as molecular agitation was different from our sensation of heat, while it is not possible to differentiate between "feeling pain" and "the sensation of feeling pain". Again, as Leibniz warned, the unfathomable fissure between objectivity and subjectivity.

Indeed, there seems to be an irreconcilable conflict between, on the one hand, the colors, sounds and smells that we perceive –including the internal flow of our thoughts– and on the other hand the inane world of particles and fields described by the fundamental physics that sustains all of them (Sellars, 1962). That was the essential tension that Levine collected in his classic article where the expression "explanatory gap" became so popular. In that paper, as brief as forceful, he managed to condense the stumbling blocks in which materialist metaphysics got stuck when trying to account for the qualitative aspects of mental states:

«Obviously, there is something right about it. Indeed, we do feel that the causal role of pain is crucial to our concept of it, and that discovering the physical mechanism by which this causal role is affected explains an important facet of what there is to be explained about pain. However, there is more to our concept of pain than its causal role, there is its qualitative character, how it feels; and what is left unexplained by the discovery of C-fiber firing is why pain should feel the way it does. For there seems to be nothing about C-fiber firing which makes it naturally "fit" the phenomenal properties of pain, any more than it would fit some other set of phenomenal properties. Unlike its functional role, the identification of the qualitative side of pain with C-fiber firing (or some property of C-fiber firing) leaves the connection between it and what we identify it with completely mysterious. One might say, it makes the way pain feels into merely a brute fact.» (Levine, 1983: 357)

Viewing the mental aspect of some neural processes as merely a brute fact of nature, with no need for further explanation, would leave us in a somewhat snubbed situation. Levine concedes that mental phenomena seem to arise only when the nervous system reaches a certain degree of complexity, which is surely plausible. However, if this were the case, we would run into the difficulty that precisely at higher levels of complexity we would not expect to find the kind of raw facts that the American philosopher compares with the specific value of the gravitational constant G . Furthermore, Levine goes on to point out that, even if we knew the correlation between certain physical configurations of the human brain and the internal experiences lived by the possessing subject,

«The point I am trying to make was captured by Locke in his discussion of the relation between primary and secondary qualities. He states that the simple ideas which we experience in response to impingements from the external world bear no intelligible relation to the corpuscular processes underlying impingement and response. Rather, the two sets of phenomena –corpuscular processes and simple ideas– are stuck together in an arbitrary manner. The simple ideas go with their respective corpuscular configurations because God chose to so attach them. He could have chosen to do it differently. Now, so long as the two states of affairs seem arbitrarily stuck together in this way, imagination will pry them apart. Thus, it is the non-intelligibility of the connection between the feeling of pain and its physical correlate that underlies the apparent contingency of that connection. Another way to support my contention that psycho-physical (or psycho-functional) identity statements leave an explanatory gap will also serve to establish the corollary I mentioned at the beginning of this paper; Namely, that even if some psycho-physical identity statements are true, we can't determine exactly which ones are true. The two claims, that there is an explanatory gap and that such identities are, in a sense, unknowable, interdependent and mutually supporting.» (Ibid: 359)

This explanatory gap –or a chasm– puts us in the uncomfortable position of recognizing that we would be unable to determine whether a creature with a physical structure different from ours could be subjected to the same experiences if it received the same stimuli. In fact, it would not even make sense to compare our sensitivity to its (in case it had something like that):

«Now, if there were some intrinsic connections discernible between having one's C-fibers firing (or being in functional state F) and what it's like to be in pain, by which I mean that experiencing the latter was intelligible in terms of the properties of the former, then we could derive our measure of similarity from the nature of the explanation. Whatever properties of the firing of C-fibers (or being in state F) that explained the feel of pain would determine the properties a kind of physical (or functional) state had to have in order to count as feeling like our pain. But without this explanatory gap filled in, facts about the kind or the existence of phenomenal experiences of pain in creatures physically (or functionally) different from us become impossible to determine.» (Ibid: 360)

3. The response of monistic materialism

Not many people in recent times have dared to advocate any form of dualism (Eccles, 1992) or panpsychism (Torday & Miller, 2018), although some quantum physicists are supposed to profess –at least in their most philosophical moments– a

version of idealism that would largely overtake Bishop Berkeley's ideas. The truth is that the triumphs of neuroscience throughout the 20th century have been so overwhelming that the indisputable correlation between the central nervous system and our psychic life has cleared the way for the preponderance of materialistic monism. The reply of the followers of monistic materialism has traditionally been to reject the existence of this explanatory gap and, therefore, to deny the problem at its very root (Churchland, 1996; Papineau, 2002; Dennett, 2005).

In their opinion, mental phenomena are identified with material processes, by virtue of which we can affirm that the sensation of pain is identical to the activation of C-type neuronal fibers, or that color vision is another mode of name a certain activity in the visual cortex (Place, 1970; Smart, 1990). Thus, the psychoneural identity is exposed in its materialist version, furtherly enriched with the broader vision of "non-reductionist physicalism", which embraces the possibility that mental phenomena are emergent results, arising from physical properties without identifying with any of them. (Bunge, 1998).

Defenders of materialistic monism point out that –as science has shown us– “mind” is the name given to a collection of brain functions, state changes or processes in the brain systems of organisms with at least a minimum degree of complexity. Those processes are closely tied to the observed behavior of such organisms, with no mind stuff of any kind for us to worry about. Given that in fact we only have an organism that operates in a certain way, when separating the functions of the organism we commit a serious categorical error. The stomach and intestines –for instance– form the digestive system because a series of biochemical processes that we call digestion take place in them. But beyond the functioning of the digestive system, digestion is not an entity in itself. That is why nobody usually argues that in nature there are digestions without digestive systems that carry them out.

For this reason, materialist monism considers that the origin of the apparent explanatory gap put forwards by Levine lies in the resistance to accepting that identity between mind and brain. In short, it would be our unconscious adherence to psychophysical dualism that would disable us from realizing that the Levine Gap does not really exist. Materialist monism does not ignore the pertinence of asking why certain physical processes entail mental aspects., or why such processes engender certain conscious sensations. What materialists hold is that these questions do not depend on a non-existent ontological disparity between mental states and material states, something that anyone would notice if we were not so often blinded by an implicit commitment to dualistic thinking.

What would be the origin of such persistent adherence to dualism? Some speculations in physiological psychology suggest the possibility of a two-way road in our cognitive architecture designed to distinguish between material and mental processes (Bloom, 2004). On the one hand we would have the "mentalist" module –so to speak– that induces us to attribute mental states to other apparently intentional agents, and on the other hand the “materialistic” module would act by allowing us to comprehensively enquire into our physical world. The practical requirement that both cognitive networks never be activated at the same time might be the reason why we conceive of mind and matter as two incommensurable realms. However, the possible existence of these two channels does not rule out in principle that mind and matter actually present radically distinctive aspects, and that our cognitive system is limited to reproducing this fact in its structure.

Whatever it is, in this debate there always appears an edge that materialist monism insists on ignoring as it lacks an explanation for it, possibly because such an explanation

is unattainable. The edge that the materialist explanation tries to avoid more or less successfully lies in the mind's immediate awareness of its own contents. That self-transparent dimension that constitutes the purest subjectivity and the center of our psychic life contains the key that we seek: «[...] Self-transparency produces a very peculiar type of recursion that occurs ubiquitously in the human mind, and is clearly absent in any other known creature. [...]» (Arana, op. cit: 39).

Here the crux of the mind-brain dilemma is revealed, the importance of which is such that it can be hardly exaggerated, no matter how much we insist on it. There seems to occur that human subjectivity preserves for itself a redoubt that seems unassailable in the face of any conquest attempt by means of the only instrument available for scientific rationality, that is, the objective scrutiny of external reality. Then, how can we objectively approach anything that by its very nature is inalienably subjective? Briefly stated, “[...] to objectify mind is to transform into an object what is in itself a subject, and therefore to deny it as such. [...]» (Arana, op. cit: 126).

If human mind is linked to brain –and everything indicates that such is the case– it follows that it must have gradually arisen by the same process of biological evolution that gave rise to the progressive encephalization of our species. And from this it would be deduced that certain types of mental states can also be attributed to other vertebrates with a relatively complex nervous system (Proctor et al, 2015; Feinberg & Mallatt, 2016a, 2016b; Birch, 2019; Ginsburg & Jablonka, 2019). They will not possess the recursion, abstraction and self-awareness capabilities typical of humans, but it is certainly not unreasonable to speak of a mind in certain animals, even when it is separated from ours by a qualitatively insurmountable barrier.

The relevance of wondering about the mental states of some animals leads to questioning whether such states or processes also possess the intrinsic qualities that are only made known to us through introspection, since they correspond to the purely subjective aspect of our psychic intimacy. This doubt inspired the famous article by Thomas Nagel (1974) in which he wondered about the perception of the world of such a different mammal from us as a bat. Thus, we see ourselves located in the center of a controversy as old as profound about those internal experiences that make up the fabric of our mental life, the *qualia*.

4. The problem of *qualia*

The term *qualia* –plural of *quale*– is due to the American specialist Clarence Irving Lewis, who introduced it in 1929 to refer to the phenomenal nature of the experiences caused by sensory data (Crane, 2000), namely, that direct, intrinsic and non-representational apprehension of our mental states that is expressed as "being such that" or "what is like". Some authors refer to this ineffable and private character to reject their existence (Dennett, 1993), while others take advantage of Wittgenstein's argument about private languages (1952) to declare them impossible (Scruton, 2016). But Wittgenstein's refutation of private languages only proves that direct awareness of our mental states is not enough to determine the meaning of the terms used to refer to them. So that,

«[...] We attribute qualities to many of our experiences not by looking in, but by looking out, to the secondary qualities of objects. Seeing red is a clear visual experience; but to describe that experience is to describe what red things look like, which in turn requires showing them. The red things are things like this; and seeing red is a visual experience that you have when you see something like this. Seeing red is different from seeing green, because red things are different from green things. Surely that raises the question of secondary qualities: are they really there, in things that seem to possess

them? I am inclined to think that the secondary qualities are dispositions to arouse experiences in the normal observer, but that the experiences themselves must be identified by the things we perceive. [...]» (Scruton, op. cit: 54)

Notice that in the foregoing paragraph all the strength of the British philosopher's argument relies on the presumed absence of *qualia* referring to purely internal experiences, without external correlate. But this is an assumption which a constellation of evidence, by no means negligible, militates against. When an individual is left in a state of sensory isolation, the suspension of almost any external sensory input is supplemented by spontaneous activity of the central nervous system manifested in the form of hallucinations. Even when these hallucinations lack connection with the reality external to the subject, there is no doubt that the subject experiences them and, in those moments, they are part of his mental states, with the direct access to them that such a situation implies.

A new argument of the greatest magnitude contributed to this dialectical battle when the imaginary Mary left her no less imaginary room. In this famous thought experiment, proposed by Frank Jackson (1982, 1986), a hypothetical girl named Mary has been born and raised inside a room where there exist no other colors than all degrees of gray between black and white. Within that room Mary learned everything that is possible to know about the physical aspects of light and chromaticity, but without direct perception of any color. When Mary goes outside and sees colors for herself it seems indubitable that she will experience a state of mind previously unknown to her. From that fact, it follows that mental states have components –that is, *qualia*– that cannot be accounted for in purely physical terms (such as the kind of knowledge Mary had about colors before she left the room). Dennett's (1991) reply, developed by arguing that a complete knowledge of physical theory would allow even properties such as *qualia* to be deduced, sounds so unbelievable that we can hesitate whether its own author embraces it wholeheartedly.

We can hardly deny the radical difference between knowing light as a physical property characterized by the magnitude we call wavelength, and the perception of light in any of its possible colors. Of course, this does not mean that mind is an entity completely independent of matter, in the dualistic way; it rather reveals the essential qualitative distinction between abstract and direct knowledge. Abstract knowledge is provided to us by the realm of theoretical physics with its primary properties (masses, charges, wavelengths, etc.), while direct knowledge involves a phenomenal, perceptual aspect, which entails an ingredient –*qualia*– which the other modality of knowledge lacks. That is why it would be said that we are handicapped by an insurmountable difficulty of principle in the attempt to identify mental events with material events (Fodor, 1975).

It is true that science strives to explain reality beyond appearances in the phenomenal sense, although the occurrence of such "appearances" is a scientifically interesting question in itself. In fact, modern science germinated when its cultivators gave primacy to primary properties –not directly perceptible– relegating secondary properties to the phenomenal box, that is, to a purely subjective stratum of reality. But there we plunged back into the little game from which we have not yet emerged: scientific research, as an objective exploration of the world, does not use phenomenal predicates (except, perhaps, as derivatives). But this one becomes an impossible claim to satisfy when we approach the very subjectivity of the individual, immediate to experience and irreducible to externalist terms.

The strictly private and ineffable nature of *qualia* seems to place them beyond any empirical verification, unlike the high degree of precision and reliability of neurophysiological mechanisms. However, in the mid-20th century, the Austrian Herbert Feigl suggested that psychological and neurological descriptions did not differ too much, since both the designation of private experience and the designation of objects in the physical world consist in translating a sensation into a certain language (Feigl, 1967). This "double designation" approach just leaves us at the gates of a non-materialist monism, whose primary claim is that mind and matter are two disparate aspects of the same underlying reality, while dispensing with any appeal to instances beyond the natural world.

Formulated by William James at the end of the 19th century and actively promoted by Bertrand Russell in the 20th, neutral monism has always been questioned due to the difficulty of specifying which is the basic element of reality whose diverse structuring, according to our perspective, gives rise to the categories of "mind" and "matter". James presented sensations as that constructive ingredient, a choice initially accepted by Russell until the British philosopher opted for chains of space-time events. In such a case we would be justified in asking how space-time events –a completely physical concept– can constitute a mind. Would not this be a modality of physicalism in disguise and, ultimately, the triumph of materialism?

5. The proposal of neutral monism

To absolve ourselves of the accusation that neutral monism only covers up a shameful version of materialist monism, it suffices to begin by accepting something obvious to many of us: in *qualia* we find irreducibly subjective elements of reality (Searle, 1992), which arise as emergent properties in systems as complex as the human brain and allow us to build and define the categorical frameworks of matter and mind (Alemañ, 2019). This interiority and self-transparency of the *qualia* establish a limit in the explanatory capacity of physicalist materialism. At the end of the 20th century, the term "mysterism" became popular as a designation for those who suspected that human mind would never completely dispel the mists that surround the self-awareness that distinguishes it from the rest of the universe (McGinn, 1989; Flanagan, 1991). In other words, we are supposed to never solve the so-called "hard problem of consciousness" (Chalmer, 1995), which consists of the search for a bridge to overcome the Levine gap.

But this appellation carries a certain injustice, since the lackness of an ultimate knowledge could be regarded as a fault for any field of research. We will never get definitive answers whatever the scientific problem we tackle, with the difference that in this case the existence of borders manifests itself in a more compelling way. Despite this, nothing prevents us from pressuring these borders to push them back as far as possible; any other behavior would be a betrayal of the scientific spirit that should animate these inquiries.

The first point to bear in mind in any approach to neutral monism is that it is in no way a mere disguise, more or less sophisticated, for traditional dualism. We are so used to thinking in dichotomous terms (dualism-materialism) that we often fail to notice the possibility of some other form of non-materialistic monism. And yet, authors who do not openly subscribe to this third option sometimes express themselves using a very sensible neutralist language:

«One nuance that must be taken into account in order to correctly interpret my position is that I do not maintain that body and consciousness refer to disjointed realities, but rather to the same reality abstracted from two different criteria

(submission to natural legality or self-transparency), criteria that resist to be reduced to the each other, although neither does the first presuppose the mere negation of the second, nor do they both necessarily exhaust the possibilities of abstracting reality. [...]. There are aspects of consciousness [...] that may very well be corporeal (that is, subject to natural legality) although the constitution of the subject-object relationship (that is, the emergence of an interior space of self-transparent representation) is in no way explainable by natural science or any other cognitive tool, because in the end all these result from it.» (Arana, op. cit: 174-175; italics in the original)

That is to say, when we group the sequences of space-time events in obedience to physical laws we have a process that can be called “material”. But when aspects such as *qualia* or the self-transparency of our psychic interiority –resistant to a purely physical description– come into play we deal with mental processes.

«[...] consciousness and the rest of what constitutes the reality of man (body, organism or whatever) do not relate to each other as two different substances, but as aspects or dimensions of a single reality. If we take that reality as it is and pass it through the naturalistic filter, we will obtain a partial version of the human that strictly adheres to legalistic schemes. We can call its content “body” [...]. On the other hand, “consciousness” does not mean [...] other than those aspects of human reality that we manage to grasp when we dispense with everything that is not the inner world of self-transparent representations. [...]» (Ibid, 192; italics in original)

Thus, the meaning of the proposition "seeing a green object" can be considered the result of a causal sequence that begins on a surface capable of reflecting light of a certain wavelength. The light beam reaches our eyes and activates the specialized cells inside them that transmit the corresponding electrical signal along the optic nerve until it reaches the brain region where it will be decoded by exciting the appropriate neuronal groups. Now, alongside with the merely physical –objective– perspective of these events there coexists a completely subjective and therefore strictly private mental aspect. This mental aspect, unlike the physical description common to all of us, depends exclusively on every individual. And as if that were not enough, *qualia* are revealed here as an essential component of the mental experience that we call “seeing a green object”.

In a material sense, "seeing a green colored object" would be symbolized as the triplet $\langle C, S, O \rangle$, where C is the sequence of causally related space-time events that connect the outer surface with the brain area on which color vision depends; S is the material system –brain– where the sequence C ends, and O represents any observer capable of making a physically objective description of the process. The mental dimension of that same fact would be symbolized by the quatrain $\langle C, S, O^*, Q \rangle$ in which the differences are marked by the presence of the *qualia*, Q , and the prescription that only a specific individual O^* has immediate access to his own mental state when he sees the green color in question.

6. Physics and psychology: The question of the thinking machine

Asking ourselves about the link between mind and matter leads us to question, sooner or later, the connection between the laws of physics and the laws –whether there exists something as such– of psychology. We verify the objective regularities that manifest entities considered elementary in the physical world. The guidelines that rule changes in apparently basic particles (electrons, photons, quarks, neutrinos) are good

candidates for this rank, without forgetting that these fundamental entities unfold in a space-time whose ontological status continues to be the subject of dispute.

Every extant thing exists in some concrete way; nothing can just "be" without any other concretion. The diverse modes of existence are the properties of things, which allow us to explain, in a certain sense, the interactions and changes of the fundamental entities. The fundamental properties limit one another by establishing more or less permanent balances and interplays –for example, conservation principles– that justify the stability of the real world. The equations that describe the various interactions among particles represent another example of this, in this case expressing a dynamic pattern of relationships affecting these fundamental objects. Thus, a fundamental law of nature would be a permanent relationship between basic properties of elementary entities.

However, in nature we not only have dispersed elementary particles; there are rocks, viruses, animals and plants, planets and stars, galaxies and all sorts of material objects made up of those basic entities. The basic entities of reality have the ability to associate to form more complex composite entities, systems, which we represent by abstract models and concepts as general as the notion of system. Needless to say that a system is not a mere collection of elements; systems have a characteristic structure and composition that endow them with properties –or “modes of existence”– different from those exhibited by its individual components. Such are the emergent properties that characterize the different levels of complexity of real systems.

It seems logical to suppose that these emergent properties, in turn, will obey their own laws, which, due to their own specificity, cannot be completely deduced from the laws of the lower levels. Consider the case of the viscosity of a fluid; it is not possible to speak meaningfully about the viscosity of the individual molecules that constitute the fluid, but neither can it be doubted that the fluid as such possesses that property. Viscosity is an emergent property that depends in part on molecular type, although it is not entirely reducible to it. Nevertheless, the key point here is to note that in the physical realm, material systems give rise to various emergent properties, depending on the level of complexity at which we move, whose character is also strictly physical.

A different case seems to be that of psychology. The activity of the brain as a material system certainly has emergent properties (such as alpha-waves) that individual neurons lack, but it happens that others also arise, such as *qualia*, that cannot be interpreted in physicalistic terms. This is the peculiarity –or, at least, one of the peculiarities– that allows us to distinguish the mental category from the material one, even when both refer to the same underlying reality. It is true that psychology would thus occupy a special place within the sciences, on possessing some emergent properties unmatched by the rest, but this trait should concern only the materialist and not the consistent neutral monist.

In symbolic terms the previous statements can be expressed as follows. Generally speaking, a material system S_M may bring about emergent properties that are of physical nature p ; or alternatively $S_M \rightarrow p$. But there is a subset of the material systems, S_ψ , that can also generate another kind of emergent properties that are exclusively psychological, p^* . That is to say, $S_\psi \rightarrow p \wedge p^*$. The presence of p^* is the main and distinctive feature of psychology that separates it from the ordinary sciences.

One more facet was added to the problem when the development of microelectronics, applied to computer technology during the second half of the 20th century, encouraged the dream of a conscious entity –with intelligence and feelings analogous to humans– made up of wires and transistors instead of neurons and glia. The vertiginous increase in the power of computers reinforced the hopes of culminating the

so-called "strong program of Artificial Intelligence", although no one clarified how the miracle of a mosaic of circuits beginning to think and feel could work. John Searle (1980), with his celebrated and unbeaten metaphor of the "Chinese room" set forth the distinction between syntactic operations and semantic contents; that is, computers can manipulate symbols, but not attribute meanings as human mind does. The Churchlands' reply (1990) lacked consistency in that it ultimately confused emergent physical and psychological properties.

For sure the controversy in this field will still last for a long time, but it should not prevent us, in the light of the evidence available today, from formulating an ontological hypothesis capable of being accommodated without excessive tensions within neutral monism. Given that *qualia* seem to constitute an inalienable component of human consciousness, although not the only one (Peters, 2014), if we accept Searle's assertion according to which an electronic device –regardless of its sophistication– lacks a mind, we will conclude that *qualia* spring out as specific emergents of only neural activity. The presently proposed psychogenic hypothesis would hold, then, that only biosystems made up of organic molecules that reach a sufficient degree of complexity can give rise to specifically mental emergent properties (such as *qualia*) and, consequently, harbor minds.

It is true that this hypothesis about the genesis of mind –not only the human– grants a special privilege to carbon, whose molecular combinations will build the biosystems in which the psyche may develop. However, this point should not necessarily be interpreted as an objection, but rather as a warning about our profound ignorance about the still unsuspected potentialities of matter, not only of mind.

8. Conclusions

The raging clarity with which the hiatus between the mental and the corporeal dimension of existence is presented to humans has given rise to one of the oldest and most unassailable philosophical problems in the history of thought. The mind-matter dualism, as natural for the early thinkers as for the layman, was postponed by the scientific revolution that gave way to Modernity. Driven by these winds of change, materialistic monism took over the battlefield, depriving their rivals of even the legitimacy to participate in the battle. And the spectacular progress of neuroscience in the 20th century seemed to back it up, since the psychoneural identity, which equated nervous activity with the subject's mental life, seemed to drive away any other option than the purely materialistic one.

In spite of all this, declining adherence to materialistic monism does not imply abandoning oneself in the arms of a dualism that, in principle, is located outside the walls of scientific inquiry. This dilemma is overcome by the existence of neutral monism, which conceives mind and matter as two expressions of the same deep layer of reality that manifests itself to us in these two modalities. The psychoneural identity of the materialists is preserved, although without granting ontological primacy to matter (an option that is not without setbacks).

The authors who have pointed out the disparity of categories between consciousness and corporality have also posed a challenge, still in force, that materialist monism has not only not responded to but has often refused to recognize. Neutral monism, even without a definitive answer to a problem that perhaps lacks one, offers a new perspective and proposals of the greatest interest. In the previous sections some of them have been outlined, beginning with the admission of *qualia* as irreducibly subjective emergent properties and, therefore, basic and inalienable elements of consciousness.

If we add to this the hypothesis that privileges biosystems based on carbon as the only ones capable of housing consciousness, we will understand the futility of endeavors

such as the "strong artificial intelligence program". Psychology thus acquires an intellectual status radically different from that of the rest of the sciences, since *qualia* are rooted in it and they seem not reducible to merely physical terms, emergent or not. But this inaccessibility should not lead us to discouragement; rather, it is a new incentive to spur us once again in the search for the true limits of human knowledge.

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