

Was Pierre Teilhard de Chardin a Panpsychist?

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The Cartesian Legacy

From Leibniz to Whitehead, panpsychism in modernity is a reaction to the Cartesian bifurcation of nature, which philosophically marks the origin of modernity. The beginning of modernity cannot be dated exactly, but it can be narrowed down. Newton was born in the year Galileo died (1642), exactly one hundred years after Copernicus published his "De Revolutionibus". Descartes' Meditations appeared a year earlier. Perhaps the most momentous discovery of modernity was the idea of a largely empirical natural science, which set itself apart from the previously prevailing concept of Aristotelian natural science, which contained much stronger rationalistic and speculative elements. The new natural science only observes what happens. It no longer has a larger system that explains *why* everything happens the way it does. The new natural science accepts the data as *facta bruta*. It wants to organize them in a nomological context of formal relations, the fundamental laws of nature, as they are classically represented in Newtonian mechanics. Temporal dynamics can be represented by the newly discovered differential calculus, i.e. the formal representation of instantaneous rates of change. Thus, it seemed, a complete formal description of nature *more geometrico* had become possible. The question of the bearer of these formal relations was rejected as metaphysical. Consequently, scientists no longer wanted to or could say anything about the inner nature of the world, the metaphysical core which lies beyond our mathematical descriptions.

The Modern View of Nature

If natural science is understood only as the formal representation of the relations between empirical data, i.e. sensory impressions, then strictly speaking a physical object is nothing more than a bundle of such sensory data or the totality of perceptions from different perspectives. Beyond that, it has no inner

material or other nature. This view, which is reminiscent of Berkeley's idealism, was advocated in the 20th century in the early days of analytic philosophy in different variants, especially in Russell's early work "Our Knowledge of the External World" (1914), but also in a different way in the phenomenism of Carnap's "The Logical Structure of the World" (1928). However, this metaphysics of nature is by no means the one that has gained the most acceptance in modernity. The "victorious" metaphysics of nature was that of Descartes, and it is quite robustly realistic. The metaphysics of material nature that he developed conceives of it as a set of spatially extended objects that are in relations of interaction with one another. The material world is characterized exclusively by the modes of extension: form, size, movement in space. These attributes of a spatial substance, the *res extensa*, were not external to it, but determine its very essence. For Descartes, the distinction between substance and attribute is not a real distinction, but rather a purely conceptual distinction in the mind. The basis of the scientific representation of nature is therefore the analytic geometry founded by Descartes, which allows problems of classical geometry to be solved independently of observation using the methods of linear algebra. The formal description of planetary orbits only became possible on this basis. In addition, linear algebra later made it possible to completely transcend the realm of the intuitive - for example in the theory of n-dimensional vector spaces. Then came mathematical analysis developed by Leibniz and Newton, which made it possible to calculate functions of real numbers, their continuity, integration and differentiability. Physics conceived in this way became the fundamental discipline in the study of nature. This concept was significantly expanded, but not fundamentally changed, by Minkowski's four-dimensional space-time formalism and the resulting general theory of relativity with its inclusion of a constitutive time dimension. Which brings us to the present day. Despite this imposing structure, the mind found no place in this picture of nature. The independent existence of mind is either denied (reductive or eliminative physicalism) or mind is juxtaposed to the material world - as *res cogitans* or as the subject of (post-)Kantian philosophy - in an unmediated way. Thus, even today, this legacy of dualism is alive and well, even if it is often not visible at first glance. This was the situation Teilhard de Chardin encountered as the predominant intellectual milieu in his time. In his "The Heart of Matter" he describes how he gradually overcame this Modern mindset.

"Until that time my education and my religion had always led me obediently to accept - without much reflection, it is true - a fundamental heterogeneity between

Matter and Spirit, between Body and Soul, between Unconscious and Conscious. These were to me two 'substances' that differed in nature, two 'species' of Being that were, in some incomprehensible way, associated in the living Compound; and it was important, I was told, to maintain at all costs that the first of those two (my divine Matter !) was no more than the humble servant of the second, if not, indeed, its enemy. Thus the second of the two (Spirit) was by that very fact henceforth reduced for me to being no more than a Shadow. In principle, it is true, I was compelled to venerate this shadow but, emotionally and intellectually speaking, I did not in fact have any live interest in it. You can well imagine, accordingly, how strong was my inner feeling of release and expansion when I took my first still hesitant steps into an 'evolutive' Universe, and saw that the dualism in which I had hitherto been enclosed was disappearing like the mist before the rising sun. Matter and Spirit: these were no longer two things, but two states or two aspects of one and the same cosmic Stuff."¹

What he describes in this passage is exactly the intuition that motivated the re-emergence and renaissance of panpsychism in the 20th century. It is not simply a Kantian turn to the subject because the subject no longer stands opposite the material world; rather, the material world is conceived of as a world of subjects. The mind is not a counterpart to the material world, but an essential part of it. This "move" is intended to enable a "post-modern" philosophy, which overcomes the dualism to whose legacy materialism, dualism and even Kantian idealism are still committed. Whitehead spoke of a "reformed subjectivist principle" that was to overcome modernity without falling back into a purely objective metaphysics of a pre-modern pattern. Pierre Teilhard de Chardin is an ally of Whitehead's in overcoming the bifurcation of nature. Their views are astoundingly similar.

The Legacy of Dualism

The arguments for dualism developed in the Cartesian tradition have the following basic structure:

- (1) There is an insurmountable epistemic gap between the mental facts of conscious experience and the purely physical facts.
- (2) If there is an insurmountable epistemic gap between mental and physical facts, then there is also an ontological gap between the two realms.

¹ Heart of Matter, 26.

(3) So monistic physicalism is wrong.

Even today, arguments critical of materialism often have precisely this structure. A much discussed one is that of the *ex hypothesi* perfect neuroscientist named "Mary", who knows all the facts about color perception in the brain. However, Mary has never seen a color herself. Let's assume she has worn glasses with small integrated black and white monitors all her life. Can Mary now deduce from this complete knowledge of the physical principles of color perception what it feels like to see the color blue, for example? Our intuition is that knowledge of what a perception of blue feels like cannot be derived from knowledge of the neurophysiology of color perception. Mary must have experienced a color perception to know these facts of phenomenal color experience. So, there is an epistemic gap between facts of conscious experience and purely physical facts. If one concludes from this epistemic asymmetry that the physical facts are different from the mental facts, then one has argued against physicalism in the style of the Cartesian tradition. If we call the time at which Mary first has a color perception "t", then we can reconstruct the argument as follows:

- (1) Mary knows all the physical facts about color perception before t.
- (2) Mary learns something at t.
- (3) Mary acquires propositional knowledge at t.
- (4) Mary learns a new fact at t.
- (5) There are facts about color perception that are not physical facts about color perception.
- (6) If physicalism is true, then there are no non-physical facts about color perception.
- (7) Thus, physicalism is wrong.

This argument is open to attack in several places, especially the thesis that Mary really learns new facts. However, the finer points of the argument are not the issue at this point (cf. Ludlow et al. 2004). The thesis of interest here is that the physical realm can be completely described without recourse to phenomenal consciousness, that is, that the brain can be completely described as a physical entity without ever coming to speak of phenomenal experience. The Cartesian tradition has drawn far-reaching ontological consequences from this. The fundamental thesis of both dualism and physicalism is that the physical substances of which the more complex physical bodies are composed do not contain

phenomenal experience (Strawson 2006). The physical is, by its fundamental nature, non-phenomenal. This "physical-contains-nothing-phenomenal-thesis" can be stated as: "Physical matter is something that by its fundamental nature is entirely without phenomenal experience." The basic material from which our world is composed is purely physical and not mental. This raises the question of how a being with conscious experience can be assembled from these completely experience-free building blocks. In principle, there are four possible answers to this question:

- (1) Strictly speaking, there is no phenomenal experience, no conscious experience. There is only complexly arranged non-phenomenal matter.
- (2) Phenomenal experience exists independently of the basic physical building blocks and does not emerge from them.
- (3) Phenomenal experience emerges suddenly and radically from a completely non-phenomenal basis.
- (4) There is phenomenal experience even in the basic building blocks. Consciousness is part of the physical world from the beginning.

Panpsychism chooses the fourth strategy. Teilhard de Chardin, we wish to argue, also endorses the fourth strategy, not the third one, as one might think. The third strategy, the emergence of consciousness from an entirely non-mental realm, will be discussed here, but only in as much as to demarcate it clearly from panpsychism. There is no systematic reason to discuss the first two strategies here. These are reductive or eliminative physicalism on the one hand and dualism on the other. Teilhard de Chardin did clearly oppose both.

Emergence

At first glance, the emergence thesis is a very attractive one. Aren't there a multitude of emergent levels in nature? Living organisms are systems that maintain a complex functional order by absorbing energy from the environment. The laws that govern the development of living things cannot be directly traced back to the fundamental laws of physics. Here, we must certainly speak of something novel, an emergent level, albeit in a weak sense. Emergence is weak here because we can, without major

conceptual problems, assume that a perfect knowledge of the physical structures of living beings implies knowledge of their biological properties such as metabolism and procreation. Weak emergence is to be distinguished from *strong* emergence. Weakly emergent novel properties are necessitated by the base level with strong modal force (across all possible worlds). Even God could not create a physical duplicate of a living being which lacks the properties of living beings. Weak emergence thus presupposes a strong concept of reduction, which can be described as "micro-reduction". Reducibility in this sense is only given if the properties to be reduced can be derived from the knowledge of the components on the reduction level alone. It should therefore be possible to fully understand (deduce) that the emergent properties necessarily arise from the basic properties of the system's components alone. From an ideal epistemic point of view, the base level is therefore "researchable" (scrutable) in terms of the conditions within it which necessitate the emergence of novel properties at a higher (weakly emergent) level. The connection between the two levels is therefore a conceptual one; the conditional connection is so strong that it could be inferred independently of additional experience (a priori) in the case of ideal knowledge. In this *weak* sense, many macroscopic objects of everyday life are emergent.

Weak emergence also allows for genuine novelty. The impression of novelty is created by the dissimilarity of the emergent properties to the basal properties. Weakly emergent system properties are not among the basal properties of the building blocks of the universe. They appear for the first time at a certain level of complexity in the development of the universe. There are usually no clear demarcation lines as to when exactly an emergent property first appears, but rather a continuous transition. The impression of novelty only arises when the intermediate stages that are similar to each other are neglected and two systems that are further apart in their complexity are considered. The similarity relation is not transitive. If A is similar to B, and B is similar to C, then A does not necessarily have to be similar to C. So even if all intermediate stages in the stage structure of the world are similar to their neighbors, distant stages can be very dissimilar. If you combine hydrogen and oxygen to form H₂O and do this in sufficient quantities, you will eventually obtain a liquid and thus the emergent system-property "liquid" will arise. There is no precise answer to how many elementary particles are needed to create a liquid. The transition is blurred. However, the liquid stuff is emergent in a weak sense. The individual hydrogen and oxygen particles are not liquid. They are too small to have such macro-properties. For scientists, however, the emergence of these properties is not mysterious. Water is liquid

because the attraction of positive and negative charges of the water molecules creates hydrogen bonds, which restrict the mobility of the molecules, they clump together a little, so to speak.

The higher-level system property "is alive" is of course not as easy to attribute as "is liquid", as we use "life" to describe a whole bundle of very complex processes such as metabolism, reproduction and self-sustaining repair of damage. However, all these processes are nothing more than complex functional patterns in physical processes, which can in principle be broken down into their small chemical and ultimately physical building blocks. Here too, the transition between non-living and living systems cannot be clearly defined (viruses). The impression of a radical break only arises if one compares very complex living systems with inorganic systems. However, the impression often arises that life is emergent in a strong sense. This is probably due to the fact that criteria such as "reaction to stimuli" are assumed to be typical criteria of life and are associated with the fact that the living being senses or experiences something. However, the phenomenal content of sensing or experiencing is precisely the problem at issue here. If we introduce experience into the picture, weak emergence collapses. How could the complex configuration of non-experiencing parts ever necessitate the emergence of experience?

According to the Cartesian bifurcation, phenomenal experience could emerge from mindless matter only in a process of a very strong emergence, mindless matter alone cannot necessitate the emergence of the mind. The relevant emergence laws cannot be deduced from the knowledge of the basic level alone. This type of emergence is quite different from that of "liquid" or even "alive. Weak emergence means that the combination of many small functional structures results in a larger pattern, which then has functional properties that its substructures did not have. It is only a matter of an increase in functional complexity within a homogeneous ontological framework. Weak emergence is therefore the appearance of new properties that are dissimilar to those of the basic level in many respects. However, this dissimilarity is only relative, since weak emergence is still within the framework of a category of attributes, for example that of functional structures in space. One could therefore also speak of *intra-attribute emergence* instead of weak emergence.

However, the qualitative content of a sensation cannot be characterized purely functionally by relations of physical entities in space (cf. Brüntrup 2003). Phenomenal experiences do not fit into the ontological framework of purely functionally determined physical entities. An emergence in which entities of a completely new metaphysical category suddenly appear is not comprehensible. Even a being with ideal

cognitive abilities could not derive these surprising leaps into a completely other metaphysical realm. They must be accepted as *facta bruta*. One can then also speak of *inter-attribute emergence*, in which properties that belong to a completely different attribute-class suddenly appear. If, for example, functionally undefinable phenomenal qualities of the mental emerge from a purely functional-spatial physical level, then two completely different attributes are placed in a brute relationship of emergence. The intellectual strain that such a concept of emergence entails can be illustrated with another example: Let us assume that, in addition to concrete entities in space and time, there are also abstract entities, like numbers, which do not exist in space and time. A radical "Pythagorean" emergence thesis would be that our world fundamentally consists of abstract mathematical entities. According to this theory, if these abstract entities are arranged in a complex way, then suddenly concrete spatio-temporal entities emerge from the abstract realm. However, the transition from an abstract to a concrete entity is not intelligible. Analogously, the transition from entities that by their fundamental nature are entirely without phenomenal experience to entities endowed with phenomenal experience is equally unintelligible. The following dilemma arises: either emergence is conceived weakly and mentality is simply a higher-level physical property like "liquid". Or the concept of emergence is so strong that anything can emerge from anything. The dependence between the base level and the emergent properties then becomes unintelligible.

In a somewhat more technical vocabulary, this relationship can also be explained using the concept of supervenience. Weakly emergent properties are in a strong sense supervenient with respect to their basic properties. There is no possible world that is an isomorphic one-to-one image of our physical world, but in which water-stuff is not liquid. The physical level forces the weak emergence of the supervenient levels (chemical, biological) with necessity. Therefore, this type of emergence of higher-level properties is not in itself mysterious, even if in complex cases it may not be known to us in detail. In the case of conscious experience, however, there is an "upward opacity" so that one, in principle, is unable to grasp how the purely physical level, void of any phenomenal experience, could force the occurrence of higher-level emergent experiential properties.

There is no a priori connection between the physical and phenomenal levels if the physical level is characterized purely functionally. This insight is shared even by most physicalists today. For conscious experience to occur, additional facts are needed to explain supervenience of the mental on the physical. These additional facts, which go beyond the physical facts, could allow for an emergentist version of

dualism. Special psycho-physical emergence laws govern the existence of minds. Physicalism is defeated. How can the physicalist account for the mind without resorting to such an emergent dualism? David Chalmers has argued that the physicalist can meet this challenge by extending his concept of the physical so that it already contains the additional facts that enable conscious experience to occur. This is a form of panpsychism which he labeled "Russellian Monism". It is worth taking a slightly closer look at Chalmers' argument to determine the exact logical place for this argumentative move (Chalmers 1996, also worth mentioning: Strawson 2006, Stoljar 2006, Rosenberg 2004, Griffin 1998, Lockwood 1989).

Two Concepts of the Physical

Recall that the basic premise is that the fundamental physical facts do not contain facts of phenomenal experience (i.e. experience does not occur in the world of physics). Chalmers' basic idea is that a world is conceivable (possible) in which all the fundamental physical facts of our world are copied one-to-one, but in which there is no phenomenal experience. He calls this the world of "metaphysical zombies". This somewhat striking name comes from the fact that in this world, of course, all strongly supervenient facts of chemistry, biology etc. would also arise in perfect copy to our world. This means that we ourselves would also appear in this world, but without conscious experience; we would be a kind of living dead, metaphysical "zombies".

In its simplest form, the argument looks like this (Chalmers 2002):

Let us define P as the logical conjunction of all physical facts (or simply: the set of all physical facts) and let us take Q to be any fact of qualitative, phenomenal experience (or simply: a fact of phenomenal experience).

- (1) It is conceivable that $\langle P \text{ and not } Q \rangle$.
- (2) If it is conceivable that $\langle P \text{ and not } Q \rangle$, then it is metaphysically possible that $\langle P \text{ and not } Q \rangle$.
- (3) If it is metaphysically possible that $\langle P \text{ and not } Q \rangle$, then physicalism is false.

However, the representative of scientific essentialism will not agree with this: The sciences discover the essence of things and therefore metaphysically exclude certain logically conceivable possibilities

(in Chalmers' classification: type-B materialism). According to the type-B materialist, the mistake lies in the fact that we work with primary intensions (level of sense) in the case of epistemic possibilities and with secondary intensions (level of reference) in the case of metaphysical possibilities. In the first case we regard a world as actual, in the second case we regard a world counterfactually. If we consider Putnam's twin earth, where XYZ is in the lakes and rivers, as actual, then "water is not H₂O" is a true proposition there, if by water we mean "the stuff that is in the rivers and lakes, drinkable, transparent, etc.". This is an epistemic possibility. If we consider the meaning of water to be fixed by our actual world (rigid designator) and then counterfactually consider the twin earth with XYZ in the rivers and lakes, then the sentence "water is not H₂O" is false. In this case, "water is H₂O" expresses a necessary truth (in Kripke's sense) which is also true in twin-earth. Let us call possibility in connection with primary intensions "1-possibility" and possibility in connection with secondary intensions "2-possibility". Now Chalmers' can state his argument more precisely:

- (1) <P and not Q> is conceivable
- (2) If <P and not Q> is conceivable, then <P and not Q> is 1-possible.
- (3) If <P and not Q> is 1-possible, then <P and not Q> is 2-possible.
- (4) If <P and not Q> is 2-possible, then materialism is false.
- (5) Materialism is false.

For (3) to be true, it is assumed that both P and Q have primary intensions and secondary intensions that coincide. In the case of Q, i.e. qualia such as pain, this is unproblematic. Something that feels like pain is pain. In the case of P, however, the situation is more complicated. Physical entities are defined by their functional role. One could say that the primary intension of "mass" picks out whatever plays the mass role in a given world. The secondary intension of "mass", on the other hand, is tied to the filler of the mass role in our world in such a way that in a world where something else occupies that role, that filler is not mass. Against this background, premise (3) can be rejected. In this case, there would be worlds indistinguishable from ours in their physical functional structure, but in which something else would be the intrinsic bearer of these functional roles. What could that be? What can be the intrinsic bearer of all functional roles? The only entirely intrinsic properties we know are the properties of phenomenal experience. In our world the phenomenal mind is intrinsic, i.e. not definable relationally.

The view that the intrinsic nature of matter, the ultimate carrier of the functional roles, has a phenomenal, i.e. mental, character is that of panpsychism. And thus we have an argument for panpsychism:

Chalmers' argument for panpsychism thus has the following structure:

- (1) <P and not Q> is conceivable
- (2) If <P and not Q> is conceivable, then <P and not Q> is 1-possible.
- (3) If <P and not Q> is 1-possible, then <P and not Q> is 2-possible or the panpsychism is true.
- (4) If <P and not Q> is 2-possible, then materialism is false.
- (5) Materialism is false or panpsychism is true.

So, if one wants to avoid the refutation of materialism as a consequence of the argument, then the assumption of panpsychism provides a loophole. However, this then means that the language of physics in our world refers to something (secondary intension) whose essence it does not fully grasp. The nature of the physical is not fully revealed by the terminology of physics. The description in the functional language of physics leaves out one crucial aspect of physical reality; and it is precisely this aspect that is the ontological basis of all phenomenal facts. We must therefore introduce two concepts of the physical: first, a concept of the physical as conceived by physics, then another concept of the physical that goes beyond what the language of physics can directly grasp. This "meta-physical" concept of the physical has (proto-)mental properties built-in (cf. Stoljar 2001). Galen Strawson accordingly distinguishes "realistic physicalism", which describes the whole nature of the physical, from a mere "physicalism" which is merely the perspective of physics as empirical science (the emphasized letter "S" is the "s" in the English word "physics"). According to Strawson, a realistic physicalism must accept and integrate the undoubted fact of the existence of phenomenal experience. Since inter-attribute emergence is incomprehensible, and a reductive explanation of phenomenal experience in purely functional terms is not possible, the only way out for a "realistic physicalism" is to regard phenomenal experience as a fundamental aspect of the physical itself (Strawson 2006, see also: Nagel 1996).

One could argue that neutral monism is another alternative. The core thesis is that mental and physical

properties emerge from a unified origin that is neither mental nor physical. Influential variants of neutral monism were advocated by Ernst Mach and Bertrand Russell (Mach 1886 / Russell 1927). However, if this underlying, neutral level does not contain any proto-mental properties, the familiar problem arises again. How can a mental entity emerge from something that has nothing in common with the realm of the mental? So, if neutral monism admits proto-mental properties on a neutral basis, then it is only an interesting variant of the broadly panpsychist position.

A Misunderstanding of Panpsychism

The spontaneous reaction to theories of this kind is incredulous amazement, because they contain the thesis that the fundamental entities that make up the universe have mental properties. However, the idea that electrons, for example, have sensations like tiny persons is obviously absurd. However, panpsychism is an important position in the history of philosophy; just think of names such as Spinoza or Leibniz. Panpsychist approaches have been advocated by influential philosophers from the pre-Socratics to the present day (cf. Clarke 2004, Skrbina 2005, Skrbina 2008). The danger of anthropomorphism was clearly seen by most proponents of panpsychism. Thus, a clear distinction is often made between conscious experiences in the full sense and their primitive predecessors. Leibniz distinguished perception from fully conscious apperception, Whitehead introduced the term "prehension" to describe non-sensory perceptions that lie far below the threshold of conscious attention. For Whitehead, the mental properties of simple actual entities were above all creativity, spontaneity and a certain informational receptivity towards the environment. He regarded this receptivity as a kind of "feeling", which is dissimilar to our conscious feeling. Other contemporary panpsychists also attribute the ability of representation to very simple entities. One example of this is physicist David Bohm (Bohm 1993). The problem here, however, is that in analogy to the human experience of waking consciousness and dreamless sleep, we regard consciousness as either fully given or entirely non-existent. This basic intuition can be abandoned, however, as it is itself an anthropomorphism. We humans cannot imagine consciousness in other species such as bats or worms, nor can we imagine which sensations are still somehow perceived in our body below the level of complex waking consciousness.

The logical structure of all these arguments is based on the non-transitivity of the similarity relation.

Let us assume a stratification of reality. Between the lowest level of elementary particles and levels of highest complexity, such as a human being, there are many intermediate levels. In terms of their mental properties, each level is similar to its neighbors. However, since similarity is not transitive, it is possible that distant levels are no longer similar in terms of their mental properties. Not only can the complexity of the mental properties decrease radically, but also the intensity and temporal frequency. Therefore, panpsychism does not imply the absurd thesis that the mental properties of the lowest layers of complexity, i.e. the elementary particles, must be conceived according to the model of human subjectivity (Brüntrup 1998).

After having located the origin of the renaissance of panpsychism in the contemporary philosophy of mind, we wish to briefly look at two historically influential arguments for panpsychism. The "Genetic Argument" and the "Argument from Intrinsic Natures". Both will be useful in answering the question whether Teilhard de Chardin was a panpsychist.

The Genetic Argument for Panpsychism

The genetic argument is based on the intuition "*ex nihilo nihil fit*", nothing can come from nothing, or more specifically: "nothing can give which it does not possess". In his essay "Panpsychism", Thomas Nagel argued that the emergence of mental properties of higher organisms should be explainable from the properties of their smallest components. However, these sought-after properties could not be of a physical nature, as one would then not understand how the mental can arise (Nagel 1996, 187-89). In the background of the genetic argument is a train of thought that has also been called the "absence-of-analysis argument". It states that the emergence of phenomenal experience from a world in which there are no proto-forms of experience remains completely incomprehensible. Gregg Rosenberg, who developed a detailed panexperientialist theory, has presented this argument in a rather intuitive form (Rosenberg 2004, here: 13-76). It is based on the idea of cellular automata: A cellular automaton consists of points or "cells" in an abstract space that have certain properties. Roughly speaking, you can imagine a chessboard pattern. Each square on the chessboard is a cell. The decisive factor is that the cellular automaton develops step by step over time. The properties change according to certain rules. Let us introduce two primitive properties as an example: Each cell can be either "off" or "on". We also assume three rules:

- If exactly two neighbors of a cell are "on", it retains its "on" or "off" property unchanged in the next step.
- If exactly three neighbors of a cell are "on", then the cell itself is "on" in the next step.
- In all other cases, the cell is "off" in the next step.

Now imagine a huge chessboard with such cells. Such a world consists of a large number of elementary particles and laws that determine the interaction of the elementary particles. "On" and "off" are the basic properties of this world, the three rules are its fundamental laws of nature. It is immediately apparent that the cellular automaton is a simple model of a physical theory. In contemporary physics, we have more than one type of fundamental elementary particle (bosons and fermions) and these have more than two properties (spin, charge, mass, etc.). But the basic structure is still very similar to the simpler case. In principle, it should therefore be possible to implement a very complicated cellular automaton on a computer, which in its complexity comes quite close to our physical world.

It has already been proven that even relatively simple cellular automata can produce an enormous variety of complex patterns. In cellular automata, patterns emerge relatively quickly that extend over several cells and show a tendency towards non-trivial self-replication. Research has shown that even the well-known self-replicative patterns of DNA can be simulated in this way. This is why these cellular automata are also called "life worlds". To explain the emergence of these complex patterns in our cellular automata, we do not need to extend its basic ontology. All higher-level properties are nothing other than complex patterns that can be completely derived from the rule-governed interaction of the elementary parts. The argument against physicalism that thus arises is an argument that points to a lack of analysis, a lack of intelligibility of the emergence of consciousness. It has the following structure:

- (1) The facts of the cellular automaton contain no facts about phenomenal consciousness, neither a priori nor a posteriori.
- (2) If the facts of the cellular automaton do not contain facts about phenomenal consciousness, then purely physical facts do not contain facts about phenomenal consciousness either.
- (3) So purely physical facts do not contain facts about phenomenal consciousness.

The argument can also be developed differently:

- (1) The fundamental properties of the cellular automaton are defined solely by their dynamic relations.
- (2) Facts of phenomenal consciousness are intrinsically qualitative facts that are not determined purely by their dynamic relations.
- (3) Facts about dynamic relations do not contain (neither a priori nor a posteriori) intrinsic qualitative facts.
- (4) So, the facts about phenomenal consciousness are not contained in the facts of the cellular automaton.

This argument gets by without speculation about metaphysically possible worlds and is therefore in some respects preferable to Chalmers' argument (Zombies). It formulates the central intuition that purely functionally defined entities have no compelling conceptual connection with the emergence of a qualitatively determined perspective of experience. The same formal structure could also relate to other or even no qualitative phenomenal contents at all. Let us briefly reconsider our example with the properties "on" and "off". How are they defined? Only by the fact that they are different and that they develop in time according to the three rules. This is a purely structural-functional view of reality that has no place for qualitative experience. This is exactly how physics works. But aren't there purely intrinsic properties in physics? Mass might be a candidate. But having a mass is the property that something has when it takes on a certain functional role, which is determined by the relation of force and acceleration: $m=F/a$. What about rest mass? It is a consequence of general relativity that only an isolated system has a coordinate-independent mass. Since a non-isolated system continuously exchanges energy-momentum with its environment, the mass at a certain point in time should also depend on the observer's determinations of simultaneity, i.e. be relatively determined. In quantum mechanics, mass is ultimately explained by the Higgs mechanism. Thus, if you only dig deep enough, you will eventually arrive at purely functional determinations.

If one accepts this "absence-of-analysis argument", then the force of the genetic argument is obvious. Let us assume that the physical world is free of any proto-forms of qualitative experience at its lower levels. If we further assume that evolution proceeds in comprehensible small steps, i.e. does not make any incomprehensible leaps. It then follows from the "absence of analysis argument" that the genesis of consciousness remains inexplicable. The relevant way out here is precisely to assume proto-forms of

experience on all levels of the physical world. This was Chalmers' way out. But already William James expressed this idea classically: If evolution is to proceed smoothly, then consciousness must have been present in some form at the very origin of things (cf. James 1890, 149).

The Argument from Intrinsic Natures for Panpsychism

The other argument is that from "intrinsic natures". An intuitive way to present it is the problem of circular interdependence of purely formal systems (cf. on this: Rosenberg 2004, ch.12, Haugeland 1993, Sellars 1963). Let us consider a purely formal structure like a chess game: it consists of circularly interdependent types: Pawns, Knights, Kings etc. Each type is precisely defined by the moves it is allowed to make in the game as a whole. Without the context of the game, none of these types could exist. But the reverse is also true: without these individual types, the game as a whole could not exist. We have a circular structure here. Each part of the game presupposes the whole game, the whole game presupposes each part. This circularity is harmless because every concrete implementation of the game of chess is based on external properties that introduce the game piece by piece. For example, we have different, distinguishable physical objects that stand for the individual types. We have a chessboard that occupies a certain position in space relative to the players. If the game of chess takes place on a computer, then there are certain physical states within the computer which, extrinsic to the logical structure, give the game a foothold and position in reality. The existence of the chess game is dependent on these external properties and relations.

The formal structure needs a support that is external to the categorical nature of the formal structure. In every level of scientific theories one finds such closed systems of circularly interdependent conceptualization. The reason why this is harmless is that for every functional conceptualization of a scientific theory there is an external level that anchors the formal description in reality. Normally this is done by going one level deeper: e.g. from the computer program to the hardware, from the biological level to the level of molecular biochemistry. The same phenomenon of circular definitions can be found in physics, since here, as already shown, the entities are also defined by their functional role. A physical entity, say an electron, is defined by the causal role it plays in the whole of physical reality, and the whole of physical reality is defined by individual types of physical entities that occur in it.

But which level is extrinsic to physics, so that physics could be realized or grounded by it? What

sustains the contrasts and relations of physics? If all physically described entities are defined interdependently via their causal roles, then the question arises as to what properties the *bearer* of these causal roles should have. What grounds physics? Every functionalist level of description requires a level of realization or instantiation. If the physical level is the ultimate, fundamental level, then there are no carriers for it. One might claim that there are always finer and more basic physical levels, and that one never thus comes to an end. However, Planck's quantum of action seems to set a clearly defined limit to the division of physical reality into ever smaller building blocks.

One possible way out would be to look for carriers that are external to any functionally characterized physical system and that by their nature are not functional but absolutely intrinsic. The only candidate for such an ultimate carrier of the physical with which we are familiar are the properties of phenomenal experience. This is an idea that Sir Arthur Eddington already formulated as follows: "Physics is the realization of structural forms, not the realization of content. An unknown content runs through the entire physical world, which is undoubtedly the basis of our consciousness" (Eddington 1920, 200, cf.: Whitehead 1933, 132). We will see that Teilhard de Chardin had a similar intuition. Bertrand Russell had also pointed out that physics grasps but the formal, mathematically representable structures of reality, while everything we know about the intrinsic properties of reality is derived from mental experience (Russell 1927, 270, 402, cf. also: Sprigge 1983). The argument from intrinsic natures for panpsychism thus states that there is no purely relational reality, and that the best candidates for the intrinsic properties we are looking for are (proto-)mental properties.

The Historical Critique of the Cartesian Concept of Matter

What are the intrinsic properties of the entities of our actual world, and to what extent do the intrinsic properties in turn determine the external, relational properties? Leibniz's metaphysics advances the thesis that all external properties must be grounded in intrinsic properties. The best candidates of intrinsic properties that can guarantee this are those that enable a mental representation of the external world. Leibniz thus arrives at a panpsychism in which each monad is a "living mirror" that mentally represents the universe from its perspective. A thought that Teilhard explicitly relates to. The crucial point is that the mechanistic concept of causal influence was replaced by that of mutual information. The whole of spatial reality was constructed by the fact that each monad had a point of perspective

from which it represented reality. Space is therefore not a given container but is constituted as an experienced and represented space. The monads do not simply passively reflect a space, but it is their activity that constitutes the spatial relations.

This idea can also be developed independently of Leibniz's monadology. The criticism of the Cartesian concept of *res extensa* expressed by many authors had very similar basic intuitions to those found in Leibniz. The mental is seen as that which grounds all physical relations. The following analysis of abstraction will try to make this point: An abstract structure in itself is not metaphysically fundamental, but it is rather derived from concrete individual things. In this sense, an abstract structure is "incomplete". A concrete entity with a geometric shape, say a cube, has a certain edge length, is made of a certain material, etc. The abstract cube, on the other hand, only has the negative property of not having a specific edge length and not being made of a specific material. One of the main temptations of scientific thinking is to take the abstract structures that can be mathematically determined for reality itself. A mistake that Whitehead characterized as the "fallacy of misplaced concreteness" and concluded that one of the main tasks of philosophy was precisely to criticize one-sided abstractions. The modern, Cartesian image of matter is precisely such an abstraction. For Descartes, a material substance consists only of modes of extension (form, size, movement in space). The fact that this image of the material world is an abstraction can be illustrated by a thought-experiment (Unger 2006, 3-33). Unger claims that two completely different worlds, if considered purely as abstract modes of extension, are indistinguishable: The first world, the *particle* world, is one in which elementary particles move through empty space according to the physical laws of that world. The second world, the *plenum* world, is one in which tiny empty spaces instead of particles move through a filled space according to the same physical laws. In their formal characteristics, the two worlds are indistinguishable. If the particles have no intrinsic nature they remain, to use another of Whitehead's expressions, "empty entities". By "empty" here is meant that they are underdetermined. The formal structure needs some concrete realization to become real. Our concrete world is therefore more than just a structured arrangement of modes of extension.

This criticism of the Cartesian view of matter was well known in Modern philosophy, perhaps more so than today (cf. Adams 2007). In the fourth part of David Hume's "Treatise", there is a section entitled "On Modern Philosophy". This cabinet piece of skeptical argumentation is a reckoning with the Cartesian concept of matter. Hume argues here that if we subtract all experiential properties such as

sound, color, taste and smell (the so-called "secondary properties") from the mind-independent external world, the entire external world becomes completely unintelligible. If we subtract the experiential qualities (sensible qualities) from the mind-independent external world, then, according to Hume, nothing remains to which one can attribute a concrete mind-independent existence. Hume goes on to show that the central intuition of materiality, namely solidity and impenetrability, cannot be explicated without the assumption of qualitatively intrinsic properties. This idea was taken up by the contemporary panpsychist Freya Mathews (Mathews 2001, 30ff.).

Leibniz had also criticized the untenability of the Cartesian concept of matter. Extension can be determined purely relationally, but what then is the nature of the relata? According to Leibniz, pure extension cannot be understood in itself. Extension is not a primitive concept, but one that can be further analyzed. It can be analyzed in plurality, continuity and coexistence of parts at a point in time. (Leibniz GW II, 169f.) Pure extension is nothing but a repetition of what is spread out. But this is not enough to explain the nature of the substance that is extended and repeated. Its concept is prior to that of its repetitive expansion (Leibniz GW IV, 467). Extension is a relative concept that cannot be explicated on its own, but only in relation to that which is or will be extended: "... extensionem non esse absolutum, quoddam praedicatum, sed relativum ad id quod extenditur sive diffunditur" (Leibniz GW IV, 394).

The early Kant also criticized the modern concept of matter for being purely relational and not knowing any intrinsic natures. It remains unclear what the substances are that stand in these relations. (Kant 1756, 480). In his critical philosophy, Kant argues that a purely relational concept of matter as an impenetrable extension is not intelligible in a classical metaphysical understanding (CPR B 340). In CPR B 321-322 Kant writes:

"We are acquainted with substance in space only through forces which are active in this and that space, either bringing other objects to it (attraction), or preventing them penetrating into it (repulsion and impenetrability). We are not acquainted with any other properties constituting the concept of the substance which appears in space and which we call matter. As object of pure understanding, on the other hand, every substance must have inner determinations and powers which pertain to its inner reality. But what inner accidents can I entertain in thought, save only those which my inner sense presents to me? They must be something which is either itself a thinking or analogous to thinking." (Transl. by Norman Kemp Smith)

Kant thus argues here, quite similarly to Russell, that although the intrinsic nature of the physical

external world is unknown to us, we can assume with good reason that the inner nature of things can be thought analogous to the mental (to "thinking"), which we know from our own experience. It seems that even Kant saw that the only way out of the Modern predicament was panpsychism. Now, endowed with these conceptual clarifications, we can finally turn to Teilhard de Chardin again.

Pierre Teilhard de Chardin as Panpsychist

The question we wanted to ask was whether Teilhard de Chardin took a similar position. Is he a "Russellian monist" in Chalmers' sense of the term? Is he arguing along the lines of Leibniz and Whitehead that the Modern concept of matter is "vacuous"? Does he even take the position that the mental is the intrinsic nature of the physical? The autobiographical quote from "The Heart of Matter" mentioned above suggests that he does. He wants to overcome dualism by relocating the mental *into the heart of matter*. Teilhard de Chardin considers dualism and the Modern bifurcation of mind and matter as disastrous:

"In the first place, under the cosmos-system, a fatal dualism was inevitably introduced into the structure of the universe. On one side lay spirit, and on the other matter: and between the two there was nothing but the affirmation of some unexplained and inexplicable coupling together—in other words there was ultimately no more than a verbal inter-dependence, which too often was akin to a subjection of one to the other." (From Cosmos to Cosmogogenesis, in: Activation of Energy, 258)

He sees the overcoming of dualism and materialism as a "third way" (*via tertia*), a bipolarism of matter and spirit, in which the extremes are intimately connected with each other.

*"Ever since man, in becoming man, started on his quest for unity, he has constantly oscillated, in his visions, in his ascesis, or in his dreams, between a cult of the spirit which made him jettison matter and a cult of matter which made him deny spirit: omegalization allows us to pass between this Scylla and Charybdis of rarefaction or the quagmire. Detachment now comes not through a severance but through a traversing and a sublimation; and spiritualization not by negation of the multiple or an escape from it, but by emergence. This is the *via tertia* that opens up before us as soon as spirit is no longer the opposite extreme but the higher pole of matter in course of super-centration. It is not a cautious and neutral middle course, but the bold, higher road, in which the values and properties of the two other roads are combined and correct one another." (The Atomism of the Spirit, in: Activation of Energy, 53)*

While matter enables functional and causal connections, it is not the basis of the mental. On the contrary: the mental as the intrinsic nature of the material grounds the existence of matter.

"Strictly speaking, if matter is defined as 'something with no vestige of consciousness or spontaneity', it does not exist. Even in pre-living particles, we saw, we must conceive some sort of curvature which prefigures and initiates the appearance of a freedom and a 'within'." (Centrology, in: Activation of Energy, 122).

"For me, matter was the matrix of consciousness and all around us matter, born of consciousness, was constantly advancing towards some ultra-human. (The Heart of Matter, 45)

Matter does not ground itself. Consciousness is the "stuff" that permeates the entire physical world. This is the very thought that was developed by physicist and panpsychist Sir Arthur Eddington in his "Space, Time, and Gravitation" (1920) as seen above.

"Consciousness' (that is to say the tension of union and desire) has in my eyes become the 'fundamental element/ the very stuff of the real, the veritable 'ether'; ... All present-day physics of matter is merely the study of a wave motion." (Letters to Leontine Zanta, 87)

But this is not meant to be an affirmation of radical idealism. The material is spiritualized, but not eliminated or downgraded to a mere phenomenon.

"Matter, it is true, is not the formal instrument of the union and interplay of the monads; but it is matter that gives the things of this world their radical capacity of entering into higher or lower syntheses, under one and the same Spirit. The essence (the formal effect) of materiality would appear to be to make beings capable of unification." (Writings in Times of War, 267)

The material aspect of reality enables connection and relatedness through time:

"In each one of us, through matter, the whole history of the world is in part reflected" (The Divine Milieu, 59).

This close connection between matter and spirit is intended to radically overcome the bifurcation of

matter and spirit.

"There is neither spirit nor matter in the world; the 'stuff of the universe' is spirit-matter." (Human Energy, 57-58)

Teilhard de Chardin introduces panpsychism by philosophical arguments that cannot be tested by direct empirical evidence because the mentality at the lowest level is too "small".

"But - interiority, the rudiment of consciousness, exists everywhere; it is only that if the particle is extremely simple, the consciousness is so small that we cannot perceive it; ..." (The Place of Technology, in: Activation of Energy, 156)

He chooses a model of panpsychism that is close to Russell's in his "The Analysis of Matter" (1927). The mental is the inside of the granular physical.

"Since the stuff of the universe has an internal face at one point in itself, its structure is necessarily bifacial; that is, in every region of time and space, as well, for example, as being granular, co-extensive with its outside, everything has an inside." (The Human Phenomenon, 24)

Teilhard de Chardin thus sees himself in agreement with the latest developments in philosophy and physics, which regard the mind as the "essence" of matter. Here he could be referring to Russell, Whitehead, Bergson and Eddington.

"Conforming to recent views which point towards the idea of a spiritual essence of matter ... " (Human Energy, 130)

A reference to Leibniz' Monadology is also clearly recognizable. The monads each represent the whole universe in their own individual way.

"At every degree of size and complexity, the cosmic corpuscles or grains are not only, as physics recognizes, centers of universal dynamic radiation but, somewhat like human beings, they possess and represent... a small "inside" (however diffuse or fragmentary it maybe...) in which is reflected, in more or less rudimentary form, a particular representation of the world: psychic centers in relation to their own selves and, at the same time, infinitesimal psychic centers of the universe. (Centrology, in: Activation of Energy, 101)

But it is not the static view of Leibniz' primarily, but rather the dynamic view of Whitehead's where the monads are internally linked by internal relations and dynamically determine each other.

"The phenomenon of man forces us to see the universe as made up of psychic nuclei, each one of which acts as a partial centre in relation to the world and is therefore potentially co-extensive with the universe: to take this view is obviously to go back to Leibniz's monads. While, however, in the static universe of monadology, the cosmic particles 'have neither doors nor windows', from the evolutionary standpoint adopted by centrology, they are seen to be in threefold solidarity one with another, within the centrogenesis in which they are born." (Centrology, in: Activation of Energy, 104)

But how can the relationship between matter and spirit be thought of more precisely? Teilhard de Chardin defines the relationship as follows:

"Every individual cosmic particle can be represented symbolically in our experience as an ellipse constructed around two foci of unequal and variable intensity - one, F1, of material arrangement, the other, F2, of psychism; F2 (consciousness) appearing and increasing initially as a function of F1 (complexity) but soon revealing a persistent tendency to react constructively on F1, in order to super-complexify it and become increasingly individualized itself." (My Fundamental Vision, in: Toward the Future, 183-84)

Even more specifically, Teilhard de Chardin developed a model of two cosmic *energies*, one psychic and the other physical. Together they determine the nature of the cosmos.

"Briefly, the 'trick' consists of distinguishing two sorts of energy: the one primary (psychic or radial energy) escaping from entropy; the other secondary (physical or tangential energy) obedient to the laws of thermodynamics - the two energies not being directly transformable into each other but mutually interdependent on each other in function and evolution (the radial increasing with the arrangement of the tangential and the tangential only becoming arranged when activated by the radial). (The Singularities of the Human Species, in: The Appearance of Man, 265 n1)

This spiritualization of matter is intended to lead to a new philosophy of life and even to a new cosmically based ethics. Panpsychism become a first philosophy on which an entire edifice can be built.

"The idea, developed above, of a spiritualizing molecularization of matter does more than throw light on the stuff of the universe, in its internal structure. The same shaft of light correspondingly brings out, in their main lines, a whole new philosophy of life, a whole new ethical system, and a whole new mysticism." (The Atomism of Spirit, in: Activation of Energy 49)

The quotations given here show that Teilhard is firmly situated in the tradition of panpsychism. There are close links to Leibniz, Bergson, Russell and, in particular, Whitehead. Unlike Whitehead, however, he does not develop a systematic philosophical cosmology comparable to "Process and Reality". His thoughts are often aphoristic and more often than not work with metaphors rather than with clearly defined terms. In addition, his philosophical thoughts are often embedded in theological speculation. However, if seen in the context of the classical and contemporary arguments for panpsychism presented earlier, it becomes clear that he is standing in this philosophical tradition. There can be no doubt that Teilhard de Chardin was one of the most influential representatives of panpsychism in the 20th century.

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