# What is the Mind?

## Prelude to Symphony of Matter and Mind

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What distinguishes living matter from non-living? The answer to this challenging question can be simple. Usually, it came down to the hypothesis of the presence of the Spirit (Soul) in living forms of matter. The simplicity of the answer is deceptive because it leads to the following question: what is the Soul? This question can be called the fundamental ontological question of all times and cultures. In the entire history of human thought, there have been countless attempts to answer, but the question remains open.

Ancient people did not have knowledge about the physical causes of the observed phenomena and came up with numerous spirits responsible for each phenomenon, including living beings. Gradually, numerous spirits acquired a hierarchy and turned into gods with broad powers, but within their area of responsibility. However, this did not increase our knowledge of physical causes. Then polytheism was almost universally replaced by monotheism, when only one God remained as the supreme hierarch, responsible for everything, including the presence of the Soul in "God's creatures."

Many philosophers said that if there were no God, he would have to be invented. But it can be stated otherwise: if we did not need to invent God, he would not have been. Perhaps, the second version reflects the situation better: the idea of God stems from the need to have a single answer to all questions. But for many, this illusion of an answer was not acceptable. Therefore, ancient scientists (philosophers, "lovers of knowledge") continued to ponder the question of the Soul.

It has many facets to it. The first one is phenomenological: we need to describe the phenomenon and its attributes. We start by "pointing a finger" at something and calling it a name (noun). Other parts of speech serve to describe the attributes and their dynamics. If there is a movement, there will be a verb. If there is a state, there will be an adjective. If there is a state change, there will be an adverb, and so on. A more detailed study of phenomena creates an ever-larger vocabulary. A distinction of characteristics creates a differentiation of the verbal code to describe them.

The same goes for the phenomenon that we call the Soul. Every language has a name for it. Moreover, it has many attributes that got their names too. What we normally experience as a single internal source manifests itself in various sensations, emotions, desires, thoughts, memories and actions. We also describe them with a complex vocabulary full of nuances. Philosophy has been developing this vocabulary for millennia without any knowledge about the actual source of all these phenomena.

Until the twentieth century, people did not see what was happening inside the body in general and in the brain in particular. They were not aware of the intricate details of its functioning and evidence that different attributes are produced by complex processes that unite into one orchestra playing the complex symphony of the Soul. Moreover, the illusion of a single source and applying a single noun to it produced the error of objectification: various processes

were united into one and were thought of as a single object that resides inside our body. Thus, the dualistic concept of dividing Soul and Body into different entities arose from the very beginning of attempts to answer the basic ontological question and stemmed from a category error of taking a process for an object. It had a simple reason: a lack of knowledge about the process.

People who considered the Soul an intangible object were either within some belief system (various religions) or an idealistic stream of philosophy. For them, the initial question produced further questions within the general Spirit-Matter problem: the hierarchy of relations (which entity is primary) and options for an independent existence of the transcendental Soul (where does it come from and where does it go).

However, as soon as we eliminate the error of objectification, the meaninglessness of the central philosophical question and its derivatives becomes apparent. There is no hierarchy since process and substrate are different categories and cannot be compared. The question of transcendental travel is also removed since the process cannot exist on its own. It is immanent: it occurs in something and with something. A similar process can occur in different and with different substrates, and various processes can happen in the same and with the same substrate.

By analogy: what we call by a noun "flow" is not an object Flow. It is a process that can occur in different and with different objects (river, hot lava, etc.). Thinking of the Soul as an independent entity living in a body is similar to calling the flow a unique spirit of the river, which can enter and leave it, move from the river into lava, and vice versa. With this analogy, the error of objectification is obvious. Still, when it comes to the question of the Soul, there are deep reasons for this error, and it is not eliminated by merely pointing to it. We will not go into existential reasons for a belief in an eternal Soul that can be separate from the mortal Body. These reasons can continue to exist, since the need for consolation and overcoming existential fear can be independent of our level of knowledge about reality. In the framework of this study, we are interested in such a reason as the lack of knowledge about physical processes in living matter, which gave rise to the idea about the existence of a special transcendental entity.

It is important to note that modern philosophy and cognitive sciences avoid the word Soul (Spirit) due to religious connotations and use the word Mind instead. Thus, the classical Spirit-Matter problem turned into the Mind-Body problem. However, when we ask ourselves to describe the Soul or the Mind, in both cases we would be talking about sensations, emotions, thoughts, and actions coming from a single source called I (Self, Person). Modern science calls all this "subjective experience" and asks the question of how the body in general and the brain in particular produce it.

Religious concepts consider the Soul to be some kind of non-material entity that can be separated from the Body but still have the same attributes of subjective experience. The question of how this intangible entity can contain the experiences of a material body when it is separated is not within the scope of the religious world view which has one answer to all the questions referring to God's mysterious ways.

The proposed study is within the scientific domain so we will use the word Mind further on to avoid any reference to intangible entities that cannot be studied empirically by definition. Thus, the central question is formulated as "*What is the Mind?*" The phenomenological part of the question can be considered as a general philosophical issue or the task for a specific study within cognitive sciences. However, no matter how many words we use to describe manifestations of the process they will still be not sufficient. We have to face other parts of the general question. *What does the Mind do? Why does it do it? How does it do it?* We can call them functional, teleological and causal aspects of the fundamental ontological question.

Why do we need to ask them and look for the answers? After the initial stage of phenomenological description comes the need to understand what functions the process performs, for what purpose it performs them, and how it performs them. These are practical,

not idle philosophical questions. They are all not easy ones but the last one is the hardest and the most crucial one if we want to solve the problem of understanding the workings of the Mind. If it is a material process that maintains the adaptability and activity of the organism as a whole, then what happens to it when such healthy activity and normal adaptation are disrupted? After all, if we do not understand the mechanism of normal operation, we cannot do anything if it is disrupted. No amount of faith in an immortal Soul will help. The paradox is that if the Soul is eternal, then it should not "break," but in reality, it is susceptible to pathologies. The only way to get rid of this paradox is to accept the idea that the Soul (Mind) is a material process in a material body.

This process produces the internal subjective experience and external actions necessary for survival. Moreover, it controls all other internal processes, and this is also vitally important. Thus, we can say with confidence that the explanation of Mind from a materialistic point of view is of greatest importance. The paradox is that until recently biology, as a science that studies living matter, was not concerned with the question. There were two main reasons for this. First, the complexity of the process and the substrate where it happens is enormous. Second, the dualistic tradition of considering it as some kind of "non-material stuff" prevented taking the issue within the scientific domain. Even if individual scientists spoke about a materialist perspective, the entire field was implicitly idealistically oriented and left the question to the philosophy of the Mind. The main assumption was that the topic was too vague and could not be studied scientifically. However, this is the wrong assumption. It keeps us in a vicious circular reasoning which says that if we cannot study something, we should not study it. The correct one is that if we formulate the topic with precise and physically testable hypotheses, we can study it scientifically. The vagueness of our concepts is only our fault.

The only science that claimed to study the Mind was psychology (from Ancient Greek psycho-logos or knowledge of the soul). However, the only aspects that it could study were subjective reports of the internal experience and external actions interpreted by a researcher. We will not go into the problems of studying subjective experience with scientific experimental methods. Some consider it to be an impossible task and look at psychology as pseudoscience. We will take a different perspective. Psychology is just following the philosophy of the Mind in widening the vocabulary of phenomenological description of the observed outcomes. All its theories, hypotheses, models, experiments and their interpretations do not say anything about the physical process and are completely detached from the actual source of the manifestations they study. This is not the way to the actual knowledge of the Mind.

We need to emphasize here that physical and biological are not synonymous. Physical is a more general category and implies fundamental mechanisms that operate in both living and non-living matter. If the Mind is a physical process in a biological substrate, a causal explanation requires elucidating the physical mechanisms that work in this substrate to produce the mental. Describing this substrate down to the finest details of its cells or even molecules does not answer the causal question of how from a physical perspective. The reason is simple: the same physical mechanisms may work in different substrates and the same substrate may use various physical mechanisms to perform the functions. The causal question "How?" is purely physical.

Biology and neuroscience as its branch have ignored the question of the Mind for most of the 20th century. They finally paid attention to the fact that the fundamental question for cognitive sciences is how the body produces the Mind. The new century has seen the rise of studies and publications on the topic and the word Mind ceased to be a taboo in neuroscience. Moreover, it has become so popular that it is probably the most frequently used keyword in publications now. The prevailing trend is to look for correlational links between the activity of the body (the nervous system in particular) and mental phenomena. There are two major research pitfalls or errors of logic here. First, despite the assumed causal chain from brain states

to mental states, the research is based on the concepts of mental functions described by psychology without any notion of the underlying mechanisms. This turns the logic of research upside-down: the independent variables (brain states) that have to be manipulated to check the dependent variable (mental states) are defined in terms of mental states and thus become dependent variables conceptually.

Looking for a correlation between the physical and something not defined in physical terms is a hopeless pursuit. It only leads to a conceptual mess, lengthy discussions, and billions spent on checking who was right or wrong to find that everyone is right or wrong without any consensus on what they are right or wrong about. The simple thought that brain functions do not necessarily fit into mental functions defined by philosophy and psychology is not alien to neuroscientists. However, the "trend is your friend" motto works, and they persistently search for correlations between specific processes in the brain and vague mental concepts.

Second, correlation does not necessarily mean causation. This simple thought is also not alien to neuroscientists. They know perfectly well that even if they show a high probability of some event in the brain correlating with the subjective report or behavior it does not mean that this event caused the observed effect. It may have caused or not. Only an assumption about the physical mechanism that produces these mental states can help us find the underlying cause by manipulating the physical parameters of the process to test the outcome.

The paradox is that the theories that currently dominate neuroscience do not concern themselves with the question of the physical mechanism and substitute it with descriptions of physiological processes. As a result, the amount of data on correlations is overwhelming but we cannot cover the explanatory gap between the biological and the mental. Calls for the bridge have been made for decades. Moreover, neuroscience tried to look into the leading theories of physics for help. However, theoretical physics has nothing to offer. It says nothing about the mechanisms of the Mind. Moreover, its concepts about physical mechanisms have internal contradictions and contradict each other. Thus, concepts taken from mainstream physical theories lead to a deeper chasm instead of building a bridge. When a neuroscientist starts talking about quantum physics, it sounds mystical. When a quantum physicist starts talking about the Mind, it sounds even more mystical. It all comes down to new versions of mysterious ways, only this time the terminology is not theological but quasi-physical. Until we uncover the physical mechanism of how the Mind is produced by whatever substrate we think is a dwelling place for it, no physically sounding terminology will cover the explanatory gap.

Some modern philosophers suggest that we should satisfy ourselves with the idea that the Mind is some fundamental entity that is non-reducible to any explanation. They even offer analogies with theoretical physics which proclaims some entities fundamental (for example, an electromagnetic force). However, saying that a force is fundamental and irreducible is only hiding the failure to explain the physical mechanism. No words and equations describing the acts of this force will cover the explanatory gap. This is why the main task of theoretical physics is the creation of a unified model of the mechanism of all fundamental interactions (including electromagnetic). Physicists understand that the phenomenological description is insufficient and they aim to answer the causal questions about Matter. Science is not just about collecting facts on phenomena of this world but about theoretically explaining them for practical purposes.

*For cognitive sciences, the ultimate task is to explain the physical causes of the Mind.* To answer the causal question from a physical perspective, we need a synthesis of knowledge in various areas. We need new physics which should include the study of the Mind as it is a physical process. We need new psychology which should include the study of physical processes as the Mind is one of them. We need new biology which should include physical and mental aspects of the living matter. We need to acknowledge previous mistakes because that is the only way to correct them. This may require conceptual revolutions as new ways of looking

at known facts. The history of science shows that these are the most difficult obstacles. However, it also shows that when we overcome them, hard problems that seem insoluble turn out to be quite solvable and, in retrospect, even seem easy. We should stop calling for a bridge between physical and mental and just build it.

The project "Symphony of Matter and Mind" is the start of such a construction. It contains the Theory of Energy Harmony [1-2] and the Teleological Transduction Theory [3-8]. The first reveals the universal mechanism responsible for all fundamental interactions and the creation of structures of Matter. The second explains the physical mechanisms that create our Mind as a material process in the material brain. The concept avoids in principle any reference to intangible entities that cannot be tested empirically. It belongs to the scientific domain and does not require faith. All proposed hypotheses are either already verified and supported by research or suggest such verification, refutation, or confirmation.

This study stands on the shoulders of the past thinkers, whether it agrees with their ideas or not, and passes the baton of studying the external and internal world to future generations.


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