

THE ONTOLOGICAL CAUSATION

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1. Mind-Body Problem

The current debate on mind-brain reductionism brings about the resurgence – or Renaissance – of Cartesianism. This problem, which can in essence be subsumed not just under philosophy or psychology, but primarily under neurosciences, proves historically to be the culmination of mind-body dualism introduced by René Descartes in the modern philosophical discourse in the 17th century. Descartes' method to differentiate the mind, defined as a purely thinking and non extended substance (*res cogitans*), from the material and extended body (*res extensa*) is clearly an ontological attempt which became well-established in the history of Modern Philosophy as *substance-ontological-dualism*. The Cartesian dualism, postulated and substantiated in *Meditations*, is based on an epistemological differentiation between the recognizability of mind from that of body, as distinctively expressed in the method of doubt or negation (of all mental perceptions and attributes of bodies). If the mind can be separately identified as opposite to the body, this cognition rests eventually upon the irreducible ontic difference between mind and body.

However, this epistemological differentiation does not refer to a spatial and temporal separation between mind and body, but implies a perfect distinction between these fundamental modes of existence. In short, we perceive the nature of the existence of mind completely different from the nature of bodily existence, since there exists an irreducible difference between the mode of being of the mind and that of the body. If *Meditations* attempts a perfect (epistemological and ontological) distinction between mind and body, it relates – in the Cartesian system – invariably to certain characteristic traits of these most fundamental modes of being (or existence). The primary and irreducible trait or attribute of the

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body is pure extension; it is a *res extensa*, i.e., an extended substance, against which the mind is neither extended nor material. The mind, which is perfectly distinct from the body, is, therefore, a non extended and immaterial substance – a *res cogitans*.

The Cartesian distinction between body and mind met with a few significant polemics in the 17th century. If the mind has – as compared to the body – neither materiality nor extension, how can a union between mind and body, as revealed particularly in bodily volition, be materialized? Two of the prominent Cartesians who posed this question in their correspondence with Descartes were the Philosopher Pierre Gassendi (1592–1655) and the Princess Elisabeth of Bohemia, daughter of King Friedrich V of Bohemia and Queen Elisabeth, a born Stuart. Descartes seemed to ignore Gassendi's objection, but took the polemic of the princess into consideration:

In October 1642 Descartes had learnt that Princess Elisabeth of Bohemia, in exile at the Hague, had read his *Meditations* with enthusiasm. He offered to visit her to explain any difficulties she encountered; but she put her questions in writing in a letter of 6 May 1643. 'How can the soul of man', she asked, 'being only a thinking substance, determine his bodily spirits to perform voluntary actions?' Descartes' reply began a correspondence which lasted until his death.¹

Princess' polemic relates clearly to a definite function of the mind, namely, the causation of volition as represented in the form of bodily movements; it equally relates to another function of the mind, namely, the sensory perceptions in which mental states are caused by bodily, i.e., physiological processes. Descartes recognizes how both these functions necessitate the union between mind and body. In his answer to Princess, Descartes differentiates the mental operation of thinking from that of sensation and volition where there is a clear union or nexus between mind and body, indicating thereby the existence of two distinct spheres of mind:

There are two facts about the human soul on which depend all the things we can know of its nature. The first is that it thinks; the second is that it is united to the body and can act and be acted upon along with it. About the second I have said hardly anything; I have tried only to make the first well understood. For, my principal aim was to

¹René Descartes, *Philosophical Letters*, ed. Anthony Kenny, Oxford: Oxford University Press, 1970, 136.

prove the distinction between soul and body and, to this end, only the first was useful, and the second might have been harmful. But because your Highness' vision is so clear that nothing can be concealed from her, I will try now to explain how I conceive the union of the soul and the body and how the soul has the power to move the body.²

2. The Causal Phenomena

The union between mind and body, which characterizes the spheres or domains of sensory perceptions and volition, is principally – how we could derive from the polemics of Princess Elisabeth – a *causal* union. If in sensory perceptions the body forms the domain of causes and the mind the domain of effects, in volition this order of causation is reversed.

How can this causal union or nexus between body and mind be differentiated from a normal causal nexus which we could easily identify in various disciplines of science, namely, Mechanics, Physics, Chemistry, Physiology, etc.? We conceive the process of causation primarily as a temporal succession of causes and effects which altogether form natural phenomena. The principle of causality states that an effect necessarily follows a cause. In other words, every effect in nature can be traced back to a cause – or to a causal phenomenon. The entire etiological diagnostics in the field of physiological sciences are based on a causal principle, that every physiological symptom of a disease as effect can be traced back to a physiological or mere physical cause. The weather forecasts are concluded from empirically given *causal* phenomena in nature; from an empirically identified local or regional difference in atmospheric pressure, we are able to conclude that it will result into a hefty wind and eventually to a rain.

In all these day to day phenomena, we could identify the elementary principle of causality. We are able to recognize without much difficulty, that the causation in these and similar natural phenomena constitutes a *sufficient* causation. A fundamental reason for the simplicity and sufficiency of these causal phenomena in the nature seems to be a domain of specific conformity between the spheres of effect and cause, as a result of which the causal processes take place within the context of a scientific discipline. The movements of billiard balls on a billiard board and their collisions are purely mechanical phenomena of causes and effects, i.e., they, as natural phenomena, can be identified within the context of

²Descartes, *Philosophical Letters*, 137-138.

classical Newtonian Mechanics alone. In the same way, the pathological effects and causes belong to the scientific domain of Physiology whose object of study is restricted to the organic body. All these forms of causal nexus evolve within the physical world; they can be subsumed under the *world of material objects*. But the causal processes like the bodily causation of mental states and operations and the mental causation of bodily volition show an *ontological* difference – rather than an ontological conformity – between the domains of causes and effects. The “leap” from bodily causation to mental effects, i.e., to mental states and operations, is so enormous and distinct, that a causal nexus between these completely different domains of cause and effect appears to us a puzzle.

We are confronted with the problem of mental causation of volition and bodily causation of mental states and operations, when we reduce these phenomena to their causes. In the above mentioned mechanical phenomena, the effects seem to be perfectly reduced to their causes, forming, thus, a *sufficient* causal reduction. In other words, in these and similar cases of a causal nexus (between effects and their causes) a *sufficient causality* is latent. A sufficient causal reduction of this nature cannot be ascribed to the mental causation of volition and the bodily causation of mental states and operations, because the sufficient or perfect causal reduction presupposes the ontological conformity between the domains of effects and causes. But there exists between mind and body an irresolvable ontic difference, i.e., a difference in their mode of being. In short, the nature of the reality of the mind is not identical with the nature of the reality of the body; they form absolutely different modes of existence.

3. The Ontological Causation

How can a mental reality be effectuated from a physical and material reality which has a clear ontic difference to it? This question is equally relevant to the mental causation of bodily volition. When we integrate the *leap* from bodily processes to mental states and operations in a causal nexus, this causal reduction implies – and is based on – a different mode of causality. The principle of causality states a necessary succession of causes and effects, all of which are temporal events or processes. The causal process is, therefore, a momentary phenomenon that connects similar momentary events of causes and effects. When the causation as an event ceases, it ceases also the event of its effect (or effectuation). As mere events, the causal processes and their effects in body and mind are subject

to this general principle of causality. The bodily causation of a mental state such as pain implies a causal nexus (or connectivity) between two different momentary events – in the domains of cause and effects. The mental causation of bodily volition can be similarly observed as a causal nexus between two momentary events of cause and effect. When the causal processes in these twofold causal nexus end or cease to exist, there occurs a cessation of their effects, namely the mental and bodily states and processes.

When the irresolvable ontic difference between the mind and the body becomes a premise in various causal nexus between these two fundamental modes of existence, it presupposes and legitimizes a different form of causality. The ontic difference between the mind and the body, which makes a *sufficient* causal connectivity between these two absolute different modes of existence impossible, results, however, from a causal principle itself. As a mode of reality, the mind, i.e., the mental states and operations, is invariably caused by the neuronal processes in body. On the other hand, the mind *causes* reality of volition, i.e., bodily states and processes. In both these cases a form of being or existence evolves from a domain of reality which is fundamentally different from it. The mental phenomena are caused *ontologically* through bodily, i.e., neuronal phenomena and vice versa. Causation of this nature can, therefore, be called an *ontological causation* which, as a principle, underlies every causal nexus between the body and the mind.

In the current discourse on brain-mind-identity which rehabilitates or historically reconstructs the old mind-body-problem, we could identify tendencies of causal-ontological reduction of mental states and processes to brain states, i.e., to different neuronal processes and structures. The identity theory (U. T. Place, J. J. C. Smart and others) states that mental phenomena *are nothing but* certain neuronal phenomena (which causes them) in brain and in central nervous system; they are *identical* with them. Mental states and operations *are* basically cerebral phenomena as observed and analyzed in the science of Neurobiology. Peter Bieri, one of the major proponents of Analytical Philosophy of Mind in Germany, emphasizes with regard to the identity theory the ontological identity between mental and neurophysiologic states and operations. Such an identity, however, implies a perfect causal-ontological reduction of mental states to brain states. The effectuation of mental states and operations is fully ascribed to a neurophysiologic phenomenality. Consequently, the mental causation of

neurophysiologic states and processes can exist only in the form of physical – i.e., again neurophysiologic – phenomena. Thus, the identity theory presupposes a causal closure of physical, i.e., bodily phenomena.

The Neurophysiology dominates the current discourse on the neuronal base of free will, especially in German academic circles; it clearly argues for the primacy of brain states and processes over the mental phenomena. The main proponents of this position are Wolf Singer, Gerhard Roth, and Wolfgang Prinz.³ All of them identify the mental causation as the foundation of free will, but reduce it to neuronal states and processes, i.e., to a neuronal causation within the context of Neurophysiology or Experimental Psychology. Accordingly, it is the brain alone and not ‘I’, i.e., my free will, which takes a decision. The self-conscious subject, upon which the entire tradition of the philosophy of free will and all the ethical and political values and notions of societies are built, will then prove to be a mere construction or rather a mythos:

Mir scheint der Satz »Nicht das Ich, sondern das Gehirn hat entschieden!« korrekt zu sein, denn »eine Entscheidung treffen« ist ein Vorgang, dessen Auftreten objektiv überprüfbar ist. Auf den linken oder rechten Knopf zu drücken oder (tatsächlich oder virtuell) durch eine linke oder rechte Tür zu gehen ist (oder benötigt) eine Entscheidung, und man kann mit entsprechendem Aufwand experimentell untersuchen, was im Gehirn passiert, bevor und wenn diese Entscheidung getroffen wird. Falls es nun stimmt, daß es nicht das wollende und bewußt erlebende Ich ist, welches die Entscheidung über eine Handlung trifft, wer entscheidet dann tatsächlich?⁴

³Wolf Singer is Professor of Neurophysiology and Director of the Max Planck Institute for Brain Studies in Frankfurt am Main. Gerhard Roth is Professor of Behavioural Psychology at the University of Bremen. Wolfgang Prinz is Professor of Psychology and Director of Max Planck Institute for Cognitive and Neurosciences in Munich.

⁴“I think the statement, ‘Not I, but my brain has decided’, to be correct, because ‘taking a decision’ is a process whose occurrence is objectively verifiable. Whether to press the left or right button or whether (really or virtually) to go through the door at left or right is (or necessitates) a decision. And we can with the corresponding experimental effort examine what happens in brain before and when the decision is taken. If it is true that it is not the willing and consciously experiencing ‘I’ who takes the decision about an action, then who decides really?” (Author’s translation). Gerhard Roth, “Worüber dürfen Hirnforscher reden – und in welcher Weise?” in *Hirnforschung und Willensfreiheit*, Frankfurt am Main:

The experimental base of these and similar arguments, which establish a *causal* primacy of brain over consciousness with regard to the free will, was the famous neurophysiologic experiment of Benjamin Libet (in the 1970s). The Libetian experiment was originally based on an assumption that the measurable brain waves as causes *temporally* coincide with the bodily effects, i.e., the external behaviour of the test persons. This causal function of the brain and the nervous system is called the *readiness potential*. Through an experiment Libet could demonstrate that it is the readiness potential that is produced first before the test person takes a decision to act physically (in Libet's experiment, pressing a button). In other words, between the development of readiness potential and its effect, namely, the free and conscious decision, a slight time-lag was observed. From this experiment the scientists of Neurophysiology tend to conclude that our free will, which we directly experience or of which we are immediately conscious, is a mere construction of our brain (since the volition always follows the development of readiness potential in a time-lag).

This position, namely, the *causal* primacy of neurobiological processes over mental states and operations, is held in Anglo-American tradition amongst others by the Philosopher John Searle. Searle denotes his philosophy of mind as *biological naturalism*. In his Reith Lectures (held in 1984 with the title, *Minds, Brains and Science*), Searle defends his basic notion of the causal primacy of brain processes which alone accomplish the various mental phenomena. "Mental phenomena, all mental phenomena whether conscious or unconscious, visual or auditory, pains, tickles, itches, thoughts, indeed, all of our mental life, are caused by processes going on in the brain"⁵ According to Searle, this causal reduction should resolve the Cartesian mind-body-dualism once and for all. I would argue, however, that this causal reduction is not a proposition which *sufficiently* resolves the problem of mind-body-dualism, i.e., how it was introduced in the modern philosophical discourse by Descartes and represented by many other philosophers in the post-Cartesian era. Descartes conceived the fundamental difference between the mind and the body in the form of an ontic difference between two absolutely different modes of being or existence. A mere causal reduction of mental states to

Suhrkamp, 2004, 77.

⁵John Searle, *Minds, Brains and Science* (The 1984 Reith Lectures), London: British Broadcasting Corporation, 1984, 18.

brain states would not be sufficient to overcome the ontic difference between these domains of effect and cause; moreover, an ontological reduction has to be postulated as the underlying principle of the theory of identity between mind and body. Therefore, in Searle's thesis, the mind is reduced to a *feature of brain* – in the same manner how the properties like solidity of ice, fluidity of water or the gaseousness of steam form different features of one and the same substance, namely water (H₂O): “Pains and other mental phenomena just are features of the brain (and perhaps the rest of the central nervous system).”⁶

Based on this thesis, Searle explains how the material phenomenon of effect – as a state of reality – in certain cases can be observed as features of an elementary and substantial domain of cause:

A common distinction in physics is between micro- and macro-properties of systems – the small and large scales. Consider, for example, the desk at which I am now sitting, or the glass of water in front of me. Each object is composed of micro-particles. The micro-particles have features at the level of molecules and atoms as well as at the deeper level of subatomic particles. But each object also has certain properties such as the solidity of the table, the liquidity of the water, and the transparency of the glass, which are surface or global features of the physical systems. Many such surface or global properties can be causally explained by the behaviour of elements at the micro-level. For example, the solidity of the table in front of me is explained by the lattice structure occupied by the molecules of which the table is composed. Similarly, the liquidity of the water is explained by the nature of the interactions between the H₂O molecules. Those macro-features are causally explained by the behaviour of elements at the micro-level.

I want to suggest that this provides a perfectly ordinary model for explaining the puzzling relationships between the mind and the brain. In the case of liquidity, solidity, and transparency, we have no difficulty at all in supposing that the surface features are *caused by* the behaviour of elements at the micro-level, and at the same time we accept that the surface phenomena *just are* features of the very system in question. I think the clearest way of stating this point is to say that the surface feature is both *caused by* the behaviour of micro-elements, and at the same time is *realized in* the system that is made

⁶Searle, *Minds, Brains and Science*, 19.

up of the micro-elements. There is a cause and effect relationship, but at the same time the surface features are just higher level features of the very system whose behaviour at the micro-level causes those features.⁷

Searle shows in the above cited examples how the surface features at macro level of a phenomenon can be caused by elements and their structures at micro level. Through these examples Searle attempts an analogy between the causation of the surface features solidity, fluidity or gaseousness through various molecular structures at a micro-level and the causation of mind through brain (which is at a micro-level). When Searle – in analogy to the material states of solidity or fluidity – identifies the mental states as surface features of brain, it implies clearly a causal and ontological reduction. Such a (causal-ontological) reduction forms the essential feature of an analytical method in which the *reality* of a complex and composite phenomenon is traced back to the causality of elementary substances or phenomena and their structures. But when we reverse the order of these and similar cases of causal nexus, we will reach at a rather synthetic process in which elementary substances and their structures *ontologically cause* higher, i.e., more complex phenomenal and mental realities. The manner in which the solidity of ice is caused by the lattice structure of water molecules, or the mental states and operations is caused by neuronal states and processes, forming various instances of an *ontological causation*.

The processes in brain which cause mental states and operations are not only physiological, i.e., neuronal, but also electromagnetic and chemical. The synapse which connects the neurons contains a messenger which functions as electro transmitter. Therefore, the causation of mental states and operations through these processes cannot be subsumed merely under a *unique* neuronal causation. Various physical processes, which form an integral part of neuronal causation, are to be taken into account. These processes belong to different domains of physical phenomenality. The electrical processes in brain and in central nervous system can be functionally or mere operationally subject to the science of Neurobiology, but it differentiates itself in its *ontic status* from neurons which are organic and form, as such, most of the brain cells. While neurons – as organic cells – belong to the scientific domain of Biology, the chemical and electro-

⁷Searle, *Minds, Brains and Science*, 20-21.

chemical phenomena in brain and in central nervous system are subject to the domain of other *inorganic* domains of Chemistry and Physics, i.e., Electro-mechanics. The chemical reactions in brain consist of molecular and atomic processes; electrons, which are subatomic particles, form the base of electrical processes. In this way, we could identify in neuronal causation of mental states and operations an *ontic progression* from an elementary physical phenomenality, as represented by the subatomic particles, atomic elements, molecular (inorganic and organic) compounds, biological and cellular neurons, etc., which altogether form the constituents of neuronal processes.

We have defined the neurobiological causation of mental states and operations as an ontological causation, in which the reality of a higher or more complex mode of being evolves from the causation of elementary modes of being. However, we could identify in the entire *ontic structure* of phenomenal reality different forms and structures of analogous ontological causation. The subatomic particles, namely electrons, protons and neutrons, cause ontologically the being or existence of atomic elements, e.g., Hydrogen, Oxygen, Carbon or Mercury. At a higher level the atomic elements cause – in different molecular structures – the inorganic and organic compounds, e.g., Water (H₂O), Carbon dioxide (CO₂), Methane (CH₄), etc. The ontological causation of molecular (organic and inorganic) compounds underlies the existence of biological phenomena, e.g., the *cellular* DNA, Proteins, Neurons, etc. The neurobiological causation of mental states and operations consists of a chain of ontological causations which are latent in the ontic (phenomenal) structure of reality.

4. Ontological Causation as Substantial and Structural Causation

Now, we examine how the ontological causation is different from our common notion of causality, conceived as a necessary temporal succession of events of causes and effects. Which are the fundamental features that demarcate the ontological causation from the normal momentary causal processes in nature? Within the domain of physical phenomena the ontological causation of elementary and *substantial* modes of being forms in principle a substantial causation from which the reality or existence of a more complex substance evolves. Therefore, the primary feature of the ontological causation is that it is a substantial causation. Electrons, protons and neutrons are elementary substances which altogether cause ontologically the material substantiality of atomic chemical elements. At a higher level, these atomic elements (H, O, N, C, etc.) cause – in different

molecular structures – a great diversity of inorganic and organic compounds of which our physical reality is composed. New compounds are produced in a chemical reaction between two or more inorganic compounds; this process is nothing but a causal-substantial restructuring of the atomic elements which are underlying the compounds, for example, $\text{H}_2\text{SO}_4 + \text{CaCO}_3 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O} + \text{CO}_2$.

Just as the substantial causation of atomic elements underlies the original compounds, the resulting new compounds evolve from an analogous ontological, i.e., substantial causation of the same atomic elements. A great diversity of organic compounds, which form the basic components of the biological phenomena, evolves from a few inorganic and atomic elements, namely Hydrogen, Oxygen, Carbon, Nitrogen, etc. In other words, the ontological-substantial causation of a few atomic elements underlies the reality or existence of all the organic compounds. In an ontic structure of reality, we could identify such ontological-substantial causation up to the neuronal causation of mental states and operations. The brain and the central nervous system which is connected to it have essentially a material-substantial phenomenality. That they cause – in different neuronal structures and processes – the immaterial, i.e., non-substantial mental states and operations, can be effectively conceived within the parameters of an ontological-substantial causation (which, as effectuation of irreducible mental states, forms a limiting mode of ontological causation in the ontic structure of reality).

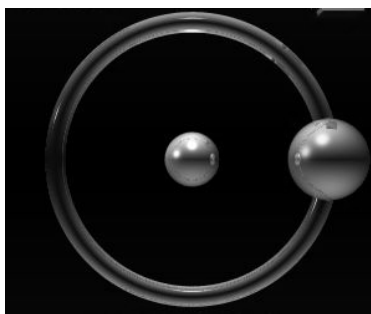


Figure 1

The ontological causation has in addition to the substantial a structural base. The elementary modes of being cause the reality of a more complex mode of being or existence not only substantially, but also structurally. The chemical elements evolve from different atomic structures of subatomic particles (electron, proton and neutron). Figure 1 shows the structure of an atom of the chemical element Hydrogen. It consists of an

electron and a nucleus with only one proton. Considering the electrons which rotate in an orbit around a nucleus, this and similar structures of atomic elements can be described as dynamic structures. In this way, different atomic elements evolve *ontologically* from a substantial as well as from a structural base of elementary subatomic particles, i.e., the existence or reality of atomic elements is *substantially and structurally caused* by the subatomic particles – electrons, protons and neutrons – which form in this ontological causation the elementary modes of being. Thus, the ontological causation (which underlies the existence of every mode of reality) includes both substantial and structural causation of elementary modes of being. The same elementary substances, i.e., the subatomic particles in different quantities and structural forms *cause* ontologically a great diversity of atomic elements; this plainly explains how within the overall phenomenon of ontological causation a substantial causation correlates with a structural causation.

The structural causation can be identified at all the levels of the ontic structure of physical or phenomenal reality. The atoms of chemical elements combine in different molecular structures resulting in inorganic and organic compounds. The molecular-structural causation is clearly established in various organic compounds. Few inorganic elements, namely, Hydrogen, Carbon, Oxygen, Nitrogen, or Phosphorous, are combined in molecular structures which bring about most of the organic compounds. The carbohydrates have more or less the same substantial base, namely, the inorganic elements Hydrogen, Carbon and Oxygen, but they are different from one another with respect to their molecular structures. A simple organic compound like Methane has its molecular structure with four atoms of Hydrogen and a single atom of Carbon. However, a molecule of Methane evolves not just from a substantial base, but clearly from a definite spatial structure as shown in Figure 2.

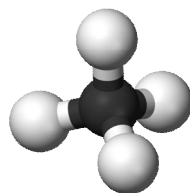


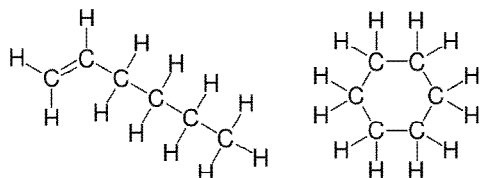
Figure 2

The existence of a Methane molecule is here materialized through a structural causation of elementary inorganic atoms of Hydrogen and Carbon. The phenomenon of isomers shows how different organic compounds with identical substantial base (of a few inorganic elements)

evolve solely from different molecular structures. Isomers are organic compounds consisting identical chemical elements in different molecular structures. Hence, they form the best examples for structural causation which, along with substantial causation, constitute the ontological causation.⁸ Beyond this domain of organic compounds – at the highest level in the ontic structure of reality – we see how the neuronal structures cause different mental states and operations. Neurons are biological cells which are composed mostly of organic compounds. Here we could observe how different mental states and operations emerge from different structures of *substantially* identical neurons.

In all the above discussed cases of ontological causation, a substantial causation correlates with a structural causation, in consequence of which a higher and more complex mode of being or existence is ontologically caused by elementary modes of being. Ontological causation of this nature (where there is a clear correlation between a substantial and structural causation) will, thus, always result into an escalation or rise of the mode of being or existence from the domain of cause to that of effect. However, such an *ontological* escalation of the mode of being seems to be determined predominantly through a substantial causation. In certain cases of mechanical phenomena, the ontological causation consists solely of a structural causation. The different physical states of a material body, namely, the solidity, fluidity and gaseousness, as well as certain material properties like transparency are ontologically caused through various molecular structures alone. The solid ice, the liquid water and the gaseous steam *are* substantially identical – i.e., all these physical states consist of identical water molecules – but they differ in their molecular structure. Here we can not trace the ontological status of different physical states to a substantial causation, since the domain of cause and the domain of effect are *substantially* identical. The physical states of solidity, fluidity and gaseousness and the material properties like transparency are solely caused by different molecular structures of the same material. In short, certain

⁸Following figure (Figure 3) shows the structures of the isomers Cyclohexane (C₆H₁₂) and 1-Hexane (C₆H₁₂).



physical states and material properties result from a structural causation which does not necessitate a correlation with a substantial causation.

Water molecules are mere components of ice, water and steam; they do not form *elementary substances* which ontologically, i.e., *substantially*, cause these physical states of one and the same material. A structural causation alone forms here the ontological causation, since there is no *ontological-substantial difference* between the domains of cause and effect. In other words, since there is no rise or escalation of the mode of being, which is to be caused ontologically through elementary modes of being, the structural causation occurs here within the context of a scientific discipline, namely the Mechanics. This *mechanical*-structural causation forms the basis of *Strength of Materials*, an important discipline of Engineering Mechanics. The sheer resistance of a footing made of steel or of reinforced cement concrete, the tensile strength a steel rope, density of a metal or viscosity of a fluid, bending moment of a beam, etc., are *mechanical* properties which can be *causally* traced back to different molecular structures of the material, or which are caused by *substantially identical* molecular structures alone.

5. Ontological Causation as Constant Causation

We have discussed the ordinary notion of causality in many of our day to day situations, which can be observed as a temporal succession of causes and effects. The causes and events in such causal nexus form momentary events. The causal events lead to effects, as long as they last or persist. However, certain effects in the form of physical states such as wetness on the surface of a road which persists even if the cause, say the rain, ceases. The dryness of the road surface and the leaves of trees are then caused by the sunshine and atmospheric evaporation. All of these causal processes are momentary events which are characterized by a temporal succession and finality of causes and effects. In contrast to it the ontological causation constitutes a *constant causation*. Within the context of ontological causation a constant (ontological) causation of elementary modes of being underlies every mode of existence as represented in an ontic structure of reality. Both the substantial and the structural causation form, in this manner, a constant ontological causation. If the elementary subatomic particles – electrons, protons and neutrons – ontologically cause the existence and reality of an atom, this casual nexus is characterized through a constant causation, i.e., a *constant coexistence* of reality and causality in the material existence of an atom. Similarly, the constant ontological

causation of inorganic elements is latent in the material existence and reality of organic compounds. The above discussed mechanical-structural causation of molecules, which brings about the physical states and properties like solidity, fluidity, gaseousness, transparency, etc., also refers to a form of constant ontological-structural causation which safeguard the existential constancy of these physical states.

Now a decisive question can be asked: Can we denote the nexus between the mental reality and its bodily-neuronal causality in terms of a constant causation? In other words, is consciousness a *constant* mental reality in which an equally constant neuronal causality is immanent? Before answering this question we will try to discuss some of the essential characteristics of the phenomenon of constant causation. In case of momentary causal connections we experience in our day to day life, the effects are seemingly brought about through *sufficient* causal events. That is to say, the effects can be perfectly reduced to causal events. The wetness of roads or leaves is *sufficiently* caused by the rainfall. (Apart from the fact that the subjective experience of wetness evolves from the bodily causation of mental states). The movements of billiard balls on a billiard board (a classical example of causal nexus which is referred quite often) follow the principles of Classical Mechanics which is based on axiomatic propositions of *sufficient* causal nexus (of mechanical causes and effects). Already the first principles of classical Newtonian Mechanics imply a causal adequacy of certain fundamental natural phenomena. The law of inertia implies an adequate or sufficient causal nexus between an effect, namely, the linear and uniform movement of a body in free space, and a causal mechanical principle, namely the inertial tendency of a body to continue its movement linearly and uniformly. Similarly, a sufficient causal nexus between effect and cause underlies the law of action and reaction.

In all these examples of mechanical phenomena the effects and their causes occur within the context of the Science of Mechanics. That is to say, a contextual conformity can be identified between the domains of effect and cause. This also implies that in mechanical causations the domains of effect and cause can be subsumed under a unitary scientific *domain of being*. Similar contextual, i.e., ontological conformity between the domains of effect and cause can be observed in other scientific disciplines like Chemistry, Physics, Physiology, Geology, etc. The adequacy of causal nexus within the contextuality of these *etiological*

sciences is, therefore, based on a principle or a prerequisite which states that the effects and their causes occur in a unitary scientific domain of being (or, in other words, there exists an ontological-contextual conformity between the domains of causes and effects).

Such an ontological (or ontological-contextual) conformity between the domains of effects and causes cannot be found in cases of ontological constant causations. The ontological causation – in the form of substantial and structural causation – brings about a rise or escalation of the mode of being or reality between causes and effects. As compared to the atomic chemical elements the subatomic particles – which cause them ontologically, i.e., substantially and structurally – have an entirely different mode of being or reality.⁹ The rise or escalation of the mode of being in the ontological causation can be identified most clearly and distinctively when neurons cause the mental states and operations which are completely different in their ontological status from the physical phenomena (to which the neuronal causation belongs). In these and similar cases of ontological causal nexus, in which a higher and more complex mode of being or reality is constantly caused by elementary modes of being, a clear *ontic difference* between the reality and its (ontological) causality is to be observed. From the subatomic particles up to the evolution of consciousness, the ontic structure of reality is characterized – at its different levels – always by a constant coexistence of causal and elementary modes of being and their effectuation of the reality of higher and more complex modes being, between which an irreducible ontic difference exists.

6. The Sufficient and Insufficient (Ontological) Causation

Another equally important feature of the ontological causation is that it forms in most of the cases an insufficient causation. The ontological causation connects in a causal nexus two different domains of being between which mostly a rise or escalation of the mode of being – from causal to effectuated states – is to be observed. This rise in the mode or status of being implies a clear ontic inconformity between the domains of cause and effect (or between ontological causality and reality), because of which the causation seems to be insufficient or inadequate. The subatomic particles, electrons, protons and neutrons, cause ontologically the existence

⁹The mode of being or reality can also be denoted as mode of existence of physical phenomena or mental states and operations. Accordingly, the ontological causation forms invariably an existential causation.

of various atomic chemical elements. But these elements, e.g., hydrogen, carbon, mercury, etc., *are* not mere combinations of the subatomic particles in different atomic structures. Similarly, the inorganic and organic compounds cannot be ontologically reduced to atomic elements which constitute them in different molecular structures. The insufficient ontological causation can be most distinctively identified in neuronal causation of mental states and operations, since at this level of the ontic structure of reality two absolutely different domains of being, namely, the purely mental and purely physical phenomena, are connected in an ontological causal nexus.

Compared to this and similar insufficient ontological-substantial causations, the ontological-structural causation of physical states and qualities, e.g., solidity, fluidity, gaseousness, transparency as well as the properties like the tensile strength or sheer force of steel structures (as discussed above), implies a sufficient ontological causation. In these cases there exists an ontic conformity between the reality (of physical states) and the constant ontological causality which is latent in it. Since there is no ontic difference between the domains of cause and effect, the reality of these physical states and its qualities can be perfectly reduced to the ontological, i.e., structural and substantial causation of the molecules. We could, therefore, rightly state that the solid ice and the gaseous steam *are nothing but* water. But such an ontological-causal reduction would not be possible if we, thereby, cross the limits of the mode of being which characterizes the physical reality of material. We cannot – in an analogous manner – declare that water *is nothing but* H₂O, a mere structural combination of two atoms of Hydrogen and one atom of Oxygen, because the *reality* of the substance water has almost nothing common with the reality of its elementary-atomic components. Similarly, we cannot simply state that an atom of Hydrogen *is nothing but* a mere structural combination of an electron revolving around a nucleus consisting of one proton, or the numerous organic compounds *are nothing but* different molecular-structural combinations of a few inorganic elements, namely, Hydrogen, Carbon, Oxygen, Nitrogen, Phosphorous, etc.

The insufficient ontological causation is, therefore, most precisely determined through the absence of an ontic conformity between the domains of cause and effect. In other word, the insufficient ontological causation presupposes an irreducible ontic difference between the reality and its ontological causality. When we reduce the solidity of a body to a

definite substantial and unitary molecular structure, we declare the reality of this physical state to be perfectly dependent on an ontological-structural causality which constantly underlies the state of solidity. However, most of the manifestations of ontological causation in nature do not presuppose such a perfect ontological-causal dependency of reality on an elementary and constant causality. The reality of water (H₂O) is only *to some extent* ontologically dependent on the reality of its atomic constituents, Hydrogen and Oxygen. That is to say, the reality of this molecular substance is to some extent *independent* of the ontological causality of its atomic constituents. Similarly, the reality of numerous organic compounds is to some degree independent of the ontological causality of its atomic constituents. This ontological-causal independence of the reality can be most clearly and distinctively identified in the neuronal causation of mental states and operations. The reality of sensory perceptions, imagination, or verbal thinking seems to be remarkably independent of the reality of the neurons which cause them ontologically. Therefore, the statement, 'mental states and operations are *nothing but* neuronal states and processes', proves to be highly inconsistent. This principle of *ontological-causal independence* imparts every (physical and mental) mode of reality its autonomy, to be more precise, an existential autonomy from the ontological causation of elementary modes of being which underlies it constantly.

As a result of the insufficient ontological causation or the ontological-causal independence, every mode of being in the ontic structure of reality appears to attain a distinctively autonomous reality – a *reality in itself*. This autonomy of a mode of being or reality is essentially supplemented with its uniqueness and finality. According to this principle, every mode of being – subatomic particles, atomic elements, molecular (inorganic and organic) compounds, biological cells, etc., forms an autonomous reality in itself. They are unique, because they remain unchanged or retain their mode of reality in all the atomic, molecular or biological structures. The same or identical subatomic particles constitute all the atomic elements. Similarly, the few identical inorganic elements (H, O, C, N, etc.) constitute a great variety of organic compounds. The modes of being or reality are also final states, because the existence of every mode of being indicates an intangible limit of phenomenality; every mode of being is a final state or form of existence *in itself*.

The autonomy, uniqueness, and finality form, therefore, the fundamental characteristics of every mode of being in the ontic structure

of reality. These characteristics remain intact both in the reality of every mode of being and in the (ontological) causality of the elementary modes of being. They are based, on the one hand, on the insufficient ontological-substantial causality and, on the other, on the irreducible ontic difference between the domains of cause and effect (which underlies the insufficient ontological causality). The greater the ontic difference between the domains of cause and effect in the ontological causation becomes, the more clear and distinct appear these features of a mode of being. The existence and qualities of chemical (atomic) elements have attained a unique, autonomous and final state of *reality in itself* which cannot be ontologically reduced to the existence and qualities of the subatomic particles. Similarly, the reality of organic compounds differentiates itself distinctively from the reality of the inorganic atomic elements which constitute them. Every mode of being attains, as shown in these and similar cases, an unknown fact of *reality in itself* which cannot be reduced to the ontological causation of elementary modes of being. However, all these modes of being can be subsumed under a general category of physical phenomena. But when the mental states and operations are ontologically caused by neuronal structures and processes, we could identify a perfect *ontic transition* from the mode of being in the domain of cause and in the domain of effect. Such an ontic transition also indicates a perfect ontic difference between these domains of reality. As effects, the mental states and operations are closely characterized by their perfect ontic difference from the neuronal causation. Consequently, the reality of mental or conscious states and processes prove themselves in contrast to the causal phenomenality of neuronal states and structures to be most distinctively autonomous. Such an existential autonomy of purely mental reality is necessarily supplemented with an existential uniqueness and finality of the highest degree.

We have discussed the *constant* coexistence of reality and causality in ontological causation. The constancy of the ontological-causal nexus safeguards the existential constancy of the *reality in itself* whose fundamental characteristics we identify in every mode of being as the existential autonomy, unity and finality. At the level of the bodily causation of mental states and operations, the constant neuronal causation should result into a constant autonomous existence of consciousness. This appears to be in contradiction with the commonly observed momentary causation of mental states and operations. All mental states and processes,

namely, the sensation, perception, thinking, imagination, etc., are momentary events which are brought about through momentary neuronal causations; i.e., they are initiated by neuronal processes and can persist, only as long as they are being *caused*. If we consider this momentary neuronal causation of mental states and operations alone, we could only reach a conclusion that the mind is a mere composition or rather summation of all our momentary mental states and operations. In other words, the existence of consciousness is solely based on the existence of momentary mental states and operations. However, the neuronal causation as ontological causation also forms a constant existential causation out of which a constant existential reality of mind and its fundamental characteristics, namely, the existential autonomy, unity, and finality should evolve. That is to say, the neurons cause not only the momentary mental states and processes, but also, primarily, the constant and autonomous existence of mind. In this way, the totality of our mind appears to be grounded on a twofold ontological-neuronal causation; the mind attains – with respect to the momentary and constant ontological-neuronal causation – a dual form of existence as represented by the existential constancy of mind and the momentary mental states and operations.

7. The Mental Causation

The momentary neuronal causation – although its effects, namely, the mental states and operations, are bestowed with a reality in itself (independent of the physical phenomenality of the brain) – forms eventually not a perfect existential but a rather functional or mere operational base of consciousness. In contrast, the constant ontological-neuronal causation appears to create and safeguard a primary mode of existence of mind which need not be supported by momentary neuronal causations. It would be interesting to observe how this twofold causation of mind and mental states and operations is significant in analyzing the mental causation of bodily volition. This reversed mode of causation, as compared to the neuronal causation of mind, remains a puzzle. Both these modes of causal nexus relate to a necessary interaction between body and mind, which forms the most fundamental aspect of the mind-body-problem – since it was introduced in the modern philosophical discourse by René Descartes. However, the mental causation of bodily volition appears to be more complex than the neuronal causation of mental states and operations.

The puzzle of mental causation, as represented in current discourses on the causal connectivity between mind and brain, is based ultimately on the problem of initiation, to be more precise, on the problem of causal initiations of volition, i.e., the acts of free will. We are *conscious* of the fact that *we* alone initiate all our acts of free will – in terms of thinking and volition. That is to say, it is our mind alone that brings about all our acts of thinking and volition originally and causally. In reality, however, all our mental operations are *caused* by neuronal states and processes in brain. A primary neuronal causation should necessarily underlie the mental causation which appears to initiate a chain of bodily causal connections – from neuronal causation to the mechanical effects, i.e., movements of the body. This will result evidently into a (logical-epistemological) vicious circle in the form a *hard-wired* system. Many Neurobiologists argue, based on this problem that it is not ‘I’, the subject, but the brain alone causes or causally initiates all the free acts of mind. I, however, feel that ‘I’, i.e., my mind alone, initiates all my free acts of thinking and volition. When I take a decision against all the valid and sufficient grounds which support a particular strategic undertaking, I act freely and autonomously. But the decision of *my* mind appears to be *primarily* caused or causally initiated by a neuronal process in my brain. This brings me into a difficult situation in which I have to ask myself the question, ‘who decides?’ ‘I’, i.e., my mind or my brain!

The mental causation will remain a puzzle, as long as we conceive our subjectivity as a totality of all our momentary perceptive and aperceptive states and operations (as represented in various modes of sensation, thinking, imagination, etc.). The momentary neuronal causation which brings about mental states and operations is normally an irreversible causal process, in which an effect should *temporally* follow a cause. We have, however, identified within the causal nexus between brain and mind a twofold, i.e., momentary and constant causation. Accordingly, the subject is not just a mere totality or synthesis of all momentary mental states and operations which are caused through (momentary) neuronal processes in brain; instead, it evolves *primarily* from a constant ontological causation in which the neuronal states and processes in brain, as elementary modes of physical being or reality, *constantly cause* the existence and reality of mind in a perfect ontic transition (as discussed above). We have seen how such a constant ontological causation can be identified at different levels of an ontic structure of reality. Through the constant ontological causation

every mode of being or reality attains its existential autonomy, unity and finality, irrespective of the nature of the elementary modes of being which cause this particular mode of being ontologically and constantly. The constant ontological causation has its most appropriate expression in the *creation* of mind, since the mind as effect evolves in a perfect ontic transition from neuronal causation (through which the mental states and operations develop distinctively their autonomy, uniqueness, and finality).

In this way, the mind appears to have a *primary* and constant mode of existence (or reality) which distinguishes it from all the secondary and momentary modes of mental existence, as represented by all forms of momentary mental states and processes of thinking, perception, imagination, etc. This primary and constant reality of mind appears, furthermore, to establish the deepest foundation of our consciousness and also of our unconscious states and operations. The initiation of all the acts of free will could, therefore, be conceived as the accomplishment of this primary and thoroughly autonomous mode of existence of the mind. 'I' experience such an initiation directly, compared to all other uncontrollable neuronal causations of mental states and operations. For example, all bodily and outer-bodily sensations are finally initiated through neuronal processes. I *should* perceive the colour and sound of external, i.e., outer-bodily objects, the pain or the taste in my body, etc., how they are brought about through a chain of causal connections – from mechanical, chemical or electro-chemical to neuronal causations; I cannot change my sensations in my immediate perceptive experience. As opposed to this, I experience my thinking and volition to be acts of my free will; I can form and control them how *I* want them to be. I identify my free will in principle not just in the course of my free acts of thinking and volition, but more precisely in the constant initiation of these conscious processes in my mind. Such an experience of free mental initiation (of thinking and volition) cannot be brought about through mere neuronal states and processes. This leads to the conclusion that the primary realm of my subjectivity, which evolves from a constant ontological-neuronal causation and attains, as such, the most perfect autonomy (i.e., ontological-causal independence from an elementary and phenomenal causality of neuronal processes in brain), *initiates* even the neuronal causations of the acts of my free will.

This most primary mental initiation of free will and its acts (thinking and volition) is a necessary condition for my direct and immediate experience of my free will in my mind. If, as opposed to this, all my acts of thinking and volition are caused merely through neuronal processes, I

cannot *experience* them in my mind as acts of my free will. In this case, the origin of my free thinking and volition becomes similar to the neuronal causation of my sensory perceptions which I cannot control subjectively. Moreover, I cannot act *freely* – verbally and bodily – if all my acts of thinking and volition are entirely initiated through neuronal processes in my brain alone; I would, in this case, act like a robot which can only function mechanically. Both sensation, which are finally initiated through neuronal processes, and the mental initiation of thinking and volition *occur* in the realm of mind, the existence of which as a distinct mode of reality and its perfect autonomy from the physical phenomenality of the brain form a necessity. It is this realm of *my existence* which connects my brain, a gray stuff hidden in my skull, with the world outside. If all my mental states and operations are initiated and caused merely through neuronal processes, I, strictly speaking, don't need my mind as a distinct and necessary realm of my existence (in other words, this condition makes my mind existentially superfluous). In this situation, I need my eyes and ears not for seeing and hearing, but just for receiving the light rays and sound waves reflected from external objects, which then eventually create retinal images and the vibrations of the eardrum – the sole inputs of neuronal processes underlying the faculties of vision and hearing. Similarly, I don't need the realm of a logical subjectivity – in order to consciously think, remember, or imagine – as all these operations can be entirely initiated and carried forth by my brain alone. In short, if the initiation of all the mental states and operations is restricted to the phenomenality of the brain alone, it does not necessitate the realm of mind as a perfectly distinct and autonomous mode of existence.

The immediately experienced operations of conscious thinking and volition indicate a realm of mind which has a perfect autonomy from the realm of brain, and on which all the conscious states and operations of the will are based. The existence of such a realm – or mode of reality – has a definite function which surpasses the extent of ontological-neuronal causation in brain. The subjective experience of my freedom of thinking and volition is primarily anchored in this realm of my mind. If all my bodily and outer-bodily sensations as well as my acts of thinking, imagination, volition, etc., can be perfectly reduced to mere neuronal processes in brain, I could still, even without my subjectivity, appear to be a normal human being. My self, however, will be devoid of consciousness; in other words, I will never experience that 'I' as a conscious being *exists*.

Since I *experience* all my subjective operations – sensation, perception, thinking, imagination, etc., – within myself, I conclude that the realm of my mind, which reveals a clear ontic difference from the realm of my brain and body, proves to be an existential necessity. This necessity clearly indicates that the initiation of my conscious acts of thinking and volition (which can be subsumed under my free will) is not established primarily through momentary neuronal processes in my brain, but it occurs in a *constantly effectuated* realm of my mind which, as compared to the physical phenomenality of the brain, form a perfectly autonomous, unique and final mode of reality. A *constant* neuronal causation underlies this reality of my mind. It, however, constitutes an ontically different, i.e., autonomous mode of existence which constantly safeguards the existence of my subjectivity or my consciousness, in short, my immediate experience that *I am*.¹⁰

¹⁰This article is a revised version of my lecture, “Mind-Body-Dualism: The Concept of Constant Causation,” under the series “Bosch Lectures,” held on 7th December 2007, at Robert Bosch India Ltd., Bangalore. It is also based on a recent postdoctoral publication (pre-print) in Freiburger Dokumentenserver: ref. *Modi der Wirklichkeit. die ontische Struktur der Wirklichkeit und das Problem der zureichenden Kausalität* (Modes of Reality: The Ontic Structure of Reality and the Problem of Sufficient Causation). FreiDok, Freiburg i. Br. 2007, <http://www.freidok.uni-freiburg.de/volltexte/4936/>.