

BRAIN, MIND AND EPISTEMOLOGICALLY DIFFERENT WORLDS

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In the last decades philosophers have offered relatively many approaches/trends for the mind-body problem; none of these approaches has been accepted by the majority of the thinkers. Even if the majority of the philosophers consider that, ontologically, mind is a physical entity, many of them do not admit the epistemological reduction of the mind to the brain. For instance, against anti-reductionism, Churchlands stresses that intertheoretic reduction – *i.e.* to reduce one theory/approach to another – is a relation that applies to distinct conceptual frameworks for describing the same phenomenon, rather than figuring out a relation between two distinct domains of phenomena (P.M. & P.S. Churchland 1990/1998, p. 70). From the opposite side, Searle enhances the idea of describing the very same system at different levels. The very same substance can be consistently but differently described at both levels of, for instance, liquidity and of H₂O molecules or of that of mental states and of neural states (Searle 1995, p. 19).

In the following, I will try to introduce certain items that suggest a possible answer to the following questions: what is to be meant by two consistent descriptions of the same system? Where do they come from? Since it is about the notion of a description level, I will focus on the epistemological dimension of the mental/neural relation. However, some implicit ontological items are suggested. I simply suggest that certain answers to the mental-neural relation are to be found by taking into account a new dimension given by the role of the observer and the conditions of the observation.

After a brief introduction to the present trends of the mind-brain problem, I will look for the role of the observational conditions in grasping mental states or neural patterns of activation. We can avoid many debates on the mind-body problem if we emphasize the main three elements involved: the human subject as an observer, the observed object (elements of mind or brain) and the conditions of the observation that imply tools of observation. Internal tools of observation (like introspection) grasp the mind; external tools of observation (like anatomical dissection and different mechanisms of scanning the brain) seize the brain.

I. PRESENT TRENDS ON THE MIND-BRAIN PROBLEM

Actually, there are many approaches to the mind-body problem. I will offer certain details only for the main ones: identity theory, nonreductive physicalism, and functionalism. Other approaches (like dualism, property dualism, epiphenomenalism, etc.) are either out of fashion or subspecies of the main approaches.

A few decades ago, within the identity theory, materialists like Place or Smart considered that mental phenomena were nothing more than physical phenomena: mental phenomena were nothing but brain states. For instance, a state of pain is identical to the firing of C-fibers. Even if the position of eliminative materialists is a little bit different, their perspective can be regarded as an offshoot of materialism. The early eliminativists, Feyerabend or Rorty, considered that such things, as desires, beliefs, hopes, etc., did not exist; actually, this is what was labelled by later eliminativists as the rejection of folk psychology. According to them, folk psychology is to be viewed as a set of dubious opinions that fail to take into account developments in (neuronal) science. For instance, epilepsy can be explained by certain disturbances of the brain states and not by demonic possession. Employing strong arguments from the neuroscience, later eliminativists, such as Churchland, have offered a better image of this framework even if the full neural evidence is not available.

On the other side, within nonreductive physicalism approach, philosophers such as Davidson, Putnam, Fodor, Nagel, Searle, Van Gulick, McGinn, or Jackson have contended in different ways for the epistemological irreducibility of mental qualitative phenomena or consciousness to physical states. Even if the mind/consciousness is to be viewed as the result of certain series of neural phenomena, the explanation of mental phenomena (or at least of some aspects of the mental state like qualitative content – *qualia*) and consciousness cannot be done in terms of neural states. Describing the mental qualitative states in causal terms leaves out the special problem of *qualia* and in general of consciousness: what does it mean to be in such a state? (Nagel, 1975) The core idea of irreducibility is that *qualia* and consciousness are subjective phenomena. Searle, for instance, considers that consciousness is a high-level property, *i.e.* an emergent trait of certain neural systems. From the micro-macro levels perspective, he always draws an analogy between the conscious (mind)/brain relation and liquidity/H₂O molecules: conscious is an emergent property of the brain in the same way that liquidity is an emergent property of the H₂O molecules (Searle, 1992). Nagel insists that the methods of the objective physical understanding “can be used on the body, including its central nervous system [...]”. However, for the explanation of qualitative phenomena, a “different form of understanding” should be considered (Nagel, 1993, p. 66).

Even if the functionalist approach “tolerates” the materialist solution to the mind-body problem offered by the identity theory, it is not an eliminativist thesis. To explain cognition is mainly to preserve the explanatory apparatus of the

mentalistic concepts. Being fully compatible with token physicalism, functionalism would not be discarded if the neural phenomena were to be “the only things with functional properties that define mental states” (Fodor, 1981/1993, p. 31).

II. THE PERSPECTIVE OF “THE OBSERVER”

The Churchlands maintain that intertheoretic reduction is available for distinct conceptual frameworks that describe the same phenomenon and not shaping the relation between two distinct domains of phenomena (P.M. & P.S. Churchland, 1990/1998, p. 70). According to McGinn, Churchland points to the confusion between ontology and epistemology made by anti-reductionism proponents.¹ Ontologically, mental states are identical with brain states and their properties. Epistemologically, folk psychology and cognitive neuroscience are to be “two distinct forms of knowledge (knowledge-by-acquaintance *vs.* knowledge-by-description)” that use two distinct vocabularies (Churchland, 1989/1998, p. 156). However, along progress in science, we can dispense of the mentalistic description provided by folk psychology.

From the opposite side, Searle agrees with the idea of describing the very same system at different levels. The very same substance can be consistently but differently described at both levels of, for instance, liquidity and of H₂O molecules or of that of mental states and of neural states (Searle, 1995, p. 219). Regarded in the terms of the above distinction (ontologically/epistemologically), Searle’s position seems to be rather vague. As Kim remarks (Kim 1998), to explain what means that the same phenomenon can be caught at different levels of descriptions, Searle has to offer a clear ontological and epistemological position on causation. How is the idea of different levels of description to be adjusted with Searle’s thesis of the “first person ontology” or “subjective ontology” and the irreducibility of consciousness (p. 49)?

In the following, I will try to introduce certain items that suggest a different perspective: what is to be meant by two consistent descriptions of the same system? Where do they come from?

II.1. Epistemologically different worlds

I simply suggest that certain answers to the mental/neural relation are to be found by taking into account a new dimension given by the role of the observer and the conditions of the observation. Thus, I consider three very simple elements: the subject as an observer of the world and of himself, the observed object, and the conditions of the observation. If in one set of observational conditions mental states can be grasped, in another set of observational conditions what the human subject can encounter are the neural states.

¹ This point is stressed in McGinn, 2001

To throw light on this idea, I need to consider the distinction between the external and internal tools of observation. By the external tools of observation we mean the instrument, the device by means of which our perceptual mechanisms are extended. The external tools frame the observed objects in the spatiotemporal frameworks that assure the objectivity of seized objects. Very roughly, I can consider that the neural patterns of activation can be observed using mechanisms that scan the brain like Positron Emission Tomography (PET has to do with regional blood flow) and functional Magnetic Resonance Image (fMRI has to do with the ratio of oxygenated to deoxygenated hemoglobin in the blood) or anatomical dissection of the brain. Through our cognitive mechanisms the special configurations of neurons formed in the cognitive processes, *i.e.* the neural patterns of activation are something that cannot be observed. But, the external tools build the proper set of observational conditions that afford the grasping of the neural patterns.

In contrast, by the internal tools of observation I mean the cognitive instruments that are the result of the evolution of our species in its ecological niche and fulfilled in the period of the development; each being species has evolved in a particular ecological niche. Due to these two processes (evolution of species and development of each member) each individual was endowed, among other devices, with certain mechanisms of observation. The internal tools of observation consist in the conceptual mechanisms of the human observer while the external tools are perceptual mechanisms or their extension. The internal tools are those that form the proper set of observational conditions for grasping the mental states and consciousness in terms of mental representations and inner experience; very roughly, they are various mental abilities or mechanisms as introspection, memory, etc. Using the internal tools, the human being “observes” the mental states frame. Instead, the observational conditions created by the external tools as PET or fMRI do not allow for grasping the mental states frame. McGinn underlines that the common characteristics ascribed to mental states and processes are: unobservable, asymmetrically accessible, subjective, nonspatial, subject-dependence (McGinn, 2001, p. 258).² But then what grounds for the objectivity of the observational conditions are there given by the internal tools? Do the internal tools of observation offer only an unscientifically subjective ground? One possible support for their objectivity could be that under the set of observational conditions shaped by the internal tools, the human subject “observes” internal objects, while in the other set of observational conditions the observed objects are mainly external.³

² In 1989, McGinn mentions “the role of perception in shaping our understanding of the brain – the way that our perception of the brain constrains the concepts we can apply to it. [...] The property of consciousness itself (or specific conscious states) is not an observable or perceptible property of the brain.” (p. 105) And “[...] the brain is, an object of perception, laid out in space, containing spatially distributed processes; but consciousness defies explanation in such terms.” (p. 106)

³ Goldfarb notices Gödel’s idea that mathematical objects are as objective as physical objects. The mathematical objects and facts are as objective (independent of our conventions or constructions) as physical or psychological objects and facts but they have a completely different nature (p. 337). Thus, there is no distinction – regarding the objective reality – between the mathematical realm and physical objects (Goldfarb, 1995). Quine endorses that the difference between physical and psychological objects is only a degree difference, they do not have a different nature

What is to count as the relation among the earlier mentioned elements – the subject, the observed object and the conditions of the observation? In one set of observational conditions given by the internal or external tools, the observer, *i.e.* the human subject observes an object. On a Kantian line, the observed object is not to be thought of as the thing-in-itself, but rather as the result of the interaction between the thing-in-itself and the observational conditions. Each set of observational conditions grasps certain features, characteristics or properties of the observed objects. The external tools allow to grab the spatiotemporal frame of the observed objects. Instead, the characteristics of the mental states grasped under the set of observational conditions formed by the internal tools of observations are not to be localizable in space and time. One way to look at this is to say that under various sets of observational conditions the human subject deals with different aspects of the same thing-in-itself. Each set of different aspects represents a certain epistemological world. In this sense, we introduce the principle of epistemologically different worlds:

(P1) Under different observational conditions, the human subject observes epistemologically different worlds of the same thing-in-itself.

Changing the observational conditions is to look for an epistemological shift of the subject (observer)-object relation. That is, by such a change the human subject passes from one epistemological world to another. Combining Spinoza’s and Kant’s terms, I can say that our conditions of observation offer us different attributes of the thing-in-itself. In fact these attributes result from the interaction between the thing-in-itself and the conditions of observation. Each epistemological world consists of a class of entities, different properties of the entities, different relations among entities, etc. I would underline that the constituents of one epistemological world can be observed only under a single set of observational conditions and, of course, the subject cannot place himself under different observational conditions at the same time. Thus, the next principle appears as something obvious – the complementarity principle:

(P2) As the attention is a serial process, a human subject cannot observe simultaneously epistemologically different worlds.

Let me take the example of a human subject observing an external object, for instance, a table. The table as a whole is static and discrete in relation to the surrounding environment. If the subject changes the observational conditions using an electronic microscope, she detects a small part of the network of micro-particles. She simply switches from focusing on the whole object to the local interactions among components. In the image-world created by the microscope the table does not exist as a whole. But this image-world is nothing else but the epistemological world created by the human subject under the set of observational conditions formed by the microscope. In the same way the network of particles doesn’t exist from the perspective of a table as a whole; the perspective of the whole is given to the observer purely because of the human ecological niche.

Again, the perspective of the whole is nothing else but the epistemological world captured by the observer under the conditions of observation given by the human ecological niche. According to the above principles, it can be thought that mind and brain are merely epistemologically different worlds of the same thing-in-itself, observed under different observational conditions. Thus, our perspective gets the picture of the mind-body problem only from an epistemological point of view. Again, on a Kantian line, due to the conditions of observations, we can say nothing neutral about the ontological status of the think-in-itself.

II.2. The part-counterpart relation or the problem of subjectivity in neural terms

In the following, I will try to see what would mean to treat one particular problem from one of the epistemological world in terms of the other. Thus, I will interpret the human subjectivity demanded by Searle or human experience demanded by Chalmers (Chalmers, 2003; 1995) in physical terms.

As I have posited, human subjectivity can be grasped only in the epistemological world observed under the observational conditions given by the internal tools. Let us see what is, in principle, that the human subjectivity is grabbed in terms of the epistemological world observed under a different set of observational conditions given by the external tools. I think that in order to deal with human subjectivity in physical terms, the following three elements have to be taken into account:

a) The most activated neural pattern at one moment.

Certain authors claim that the most activated neural pattern is to be taken as representing a certain consciousness mental state. On this line, Kanwisher mentions “the strength hypothesis”: the more active a given neural representation, the stronger its representation in awareness. However, against this hypothesis Kanwisher follows Baars’ route: “(...) awareness of a particular element of perceptual information must entail not just a strong enough neural representation of that information, but also access to that information by most of the rest of the mind/brain.” (Kanwisher, 2001, p. 105).⁴ I point out that Baars proposed in 1988 “the global workspace” paradigm for consciousness: the brain as a whole, or at least a large part of it, is engaged for consciousness at one moment. Thus I introduce the second element:

b) A certain part of the nervous system which consists of a considerable number of less activated neural patterns than the most activated one; the set of these patterns can be viewed as forming a pyramid of neuronal patterns of activation.

⁴ Moreover, Kanwisher brings up the studies made by Luck *et al.* in 1996 and Rees *et al.* in 2000 that show that neural signals can be as strongly activated in conscious states as in unconscious states.

Certain scientists support that the most activated pattern of activation is contained by a certain part of the brain, which also consists of other neural states with a lesser degree of activation. For instance, Kanwisher presents the idea introduced by Green and Swets in 1966 in which the perceptual awareness is not “() an all-or-none affair, but a graded phenomenon which admits many shades of grey” (Kanwisher, 2001, p. 103). In the ’80s a further step was made by Treisman that underlined that the attention, *i.e.* the feed-back projections from high levels to low level of vision, is involved even for the binding processes (Treisman 1998a, 1998b). On the same line, Crick and Koch asserted that the neural correlates of consciousness at one time engage a part of the cells but their firing influences other parts of the neurons. They called these parts ‘penumbra’ that has a strong relation with the understanding process (Crick and Koch, 2003).

In psychological terms, Keil considers that the meaning of a concept depends on the meaning of other concepts (Keil, 1989). Thus there are implicit links between the principal concept (that corresponds to the most activated pattern) and other concepts (that correspond to the patterns from the rest of the part of the brain).

c) The counterpart of that part which is not activated (or at least it is not to be seen as activated under the observational conditions provided by PET and fMRI). Moreover, because the sensory systems are the extended parts of the nervous system, the whole body has to be added to the mentioned counterpart.

Nevertheless, all these are simply elements of the epistemological world called body/brain. As we maintained above, we could not identify exactly what entities of other epistemological world (the mind) correspond to these elements. Then the counterpart of this part is to be the rest of the brain and the body. In these terms, a certain understanding on the human subjectivity is given by the next part-counterpart principle:

(P3) In physical terms, the part-counterpart relation corresponds to the human subjectivity.

One prop for the subsistence of the counterpart is offered by Llinas and Pare: the perception at a given moment is “represented by a small percentage of coherently oscillating cellular elements over the whole thalamocortical system. The rest of the thalamocortical system, being silent to such coherence, may in fact represent the necessary counterpart to the temporal pattern of neuronal activity that we recognize individually as cognition” (Llinas and Pare, 1996). If such counterpart is necessary to explain perception at a certain particular moment then it seems obvious that the counterpart has to be engaged in explaining human subjectivity.

The most activated pattern of neurons, at any one moment, has considerable implicit links with other patterns of neurons that are less activated. This leads to the formation of the pyramid of neuronal patterns of activation. In this sense, Llinas and Pare posit, “The fact that all frequencies are not equally probable determines that certain resonant frequencies will be observed preferentially.” The cognitive task of focusing attention on a certain single item seems to engage a considerable

number of implicit links among the nodes of the most activated pattern and the nodes of other less activated patterns, which form a sort of pyramidal patterns of activity. "The selective property of attention is presumed to be expressed by a positive difference between the activity levels in columns that code for the target and the activity levels in neighbouring columns that code for other (distracting) objects." (David LaBerge, 2002) Indeed, there are certain facts from neuroscience which suggest a direct correlation of the most activated neural pattern with a certain mental state. For instance, Rolls points out that "[...] if we know the average firing rate of each cell in a population to each stimulus, then on any single trial we can guess the stimulus that was present by taking into account the response of all the cells." (Rolls, 2001, p. 157) However, for human beings even the *perceptual awareness* is a complex process that implies feed-forward and probably feed-back projections between early visual processing and high levels areas of neurons (see for instance Treisman, 1998a, 1998b; Kanwisher, 2001, etc.). I emphasize that it is almost impossible to guess the complex cognitive processes of the human beings (those for instance that imply the process of meaning or understanding) looking only at neural activations with fMRI or PET.

Different scientists offered ideas for explaining mind or consciousness through neural terms. The phenomenon of consciousness is to be identified with 40 Hz neural oscillations across different parts of the brain (Crick and Koch, 1996),⁵ or with reentrant mapping among patterns of neurons Edelman (1992), etc. From the observer's perspective both directions imply the part-counterpart principle. Certain philosophers continue the line of Nagel and Searle; Chalmers institutes the distinction between "easy problems" (certain functions realized by different physical mechanisms in the brain like the ability to discriminate stimuli, to monitor internal states, to control the behaviour, etc.) and "hard" problem (the problem of subjective experience: there is something it is likely to be – *i.e.* the performance of each function is accompanied by experience) (Chalmers 1995, 2003). Again, to talk about the phenomenon of subjectivity or about subjective experience means to talk about the part-counterpart relation: each function is realized by physical mechanisms represented by certain neural patterns and these neural patterns are, according to principle III, accompanied by a counterpart. Thus the subjective experience is explained by the counterpart that is still a physical component. However, as I have pointed above, it is almost impossible for this process to be caught through the external tools of observation (like fMRI, PET, etc.). After advanced researches in the brain surgical intervention area and later, by manufactured devices like microscope, fMRI and PET, the phenomenon of subjectivity has still remained unexplained through neural terms.

As I stated in (II.1) each set of observational conditions captures certain characteristics or properties of the observed objects. On the one hand, the human subject observes the epistemological world of the observational conditions given

⁵ Later they discarded this idea (see Crick and Koch, 2003)

by the external tools, *i.e.* in very general terms the observers grasp the epistemological world of the neural states and processes. By means of the external tools of observation, the observer grasps a certain spatiotemporal frame of the observed objects. For instance, the observer can depict certain causal relations among the neuronal patterns of activation.

On the other hand, under the conditions of observation given by the internal tools the observer grasps the epistemological world of the subjectivity, mental states, and the relations among them. This epistemological world is what can be roughly called subjectivity or consciousness. As I presented in part I, the anti-reductionists sustain that *qualia* cannot be explained at the neural level: there are no explanations of how electro-chemical events produce the feeling of pain. Kalin sketches a hypothesis regarding the feeling of fear: when a young monkey is separated from its mother the opiate-releasing process takes place and neurons become inhibited because they are sensitive to the opiate (Kalin, 1993). In this sense, Warner asks how such inhibitions produce the feeling of yearning for the mother and he continues with "What we know is the inhibition correlates with the feeling." (Warner, 1993, p. 14) Typically, pain is correlated with the firing of C (even if it was discovered that there are other kind of cells that are activated during these processes, the C fibre remained a generic name for the physical events corresponding to the mental ones). But we think that the real problem lies in identifying a certain physical state with a mental one. According to the earlier mentioned aspects, it is not enough to focus on the most activated pattern alone for stressing the problem of mental states in physical terms. The feeling of fear engages not only the most activated pattern but also other parts of the brain and body itself. It is no doubt that the complete understanding of the part-counterpart relation can fully deal with the hard problem of subjectivity. Therefore, the problem that still remains is that of a complete understanding of the part-counterpart relation. I think that a possible proof of the impossibility of a complete understanding of such relation can be found in the last period of researches on complex systems.⁶

III. THE EXPLANATORY GAP, MENTAL CAUSATION, EMERGENCE, REDUCTION AND THE PERSPECTIVE OF THE OBSERVER

Some very interrelated concepts within the mind-body problem (the explanatory gap between the neural explanation and the psychological one, the mental causation, emergence, reduction, consciousness, etc.) are subjects of many debates.⁷ The *domino principle* seems to join all these problems together. If one of

⁶ See for the problem of observational emergence in complex systems, cellular automata and connectionism in Terhesiu (this issue) and Terhesiu and Vacariu (2002).

⁷ An interesting classification of different approaches on consciousness and the mind-body problem is made recently by Chalmers (2002). Van Gulick (2001) makes a categorization of different approaches on reduction and emergence

them breaks down then all the other problems are crashed. On the other hand, if one of them receives a satisfactory answer, then this answer applies with slight variations to all of them.

Let us see how the observer perspective is to be related to the above-mentioned problems. Each set of tools of observation grasps certain characteristics of the observed objects.⁸ These characteristics can be entities in one epistemological world or properties in other epistemological world. By changing the conditions of observation, the human observer can pass from one epistemological world to another,⁹ *i.e.*, for instance from a sum of entities that belong to one epistemological world to the property of one object from other epistemological world.

The external tools offer the spatiotemporal frames and thus certain perceptual entities can be observed. It is possible to reveal the correspondence between certain entities of two epistemologically different worlds if both worlds have certain spatiotemporal frames. Let us take the classical example of water and H₂O. A human subject observes, under ecological observational conditions, the amount of water in a glass. Using a microscope, *i.e.* changing the epistemological world, she can observe molecules of H and O. As both these tools of observation offer a spatiotemporal frame, a correspondence between the denotations of both terms is possible (but not an identity between them). Water belongs to that epistemological world given by the ecological conditions of observation. For a human observer it is a kind of entity with one main property: fluidity. The correspondent of fluidity in other epistemological world is the interactions between H and O molecules. Using a microscope, the subject shifts to other epistemological world and observes molecules of H and O in which a bundle of other kinds of objects are tied by different forces. In this world, fluidity does not exist. For this reason, we cannot locate in the same epistemological world both fluidity and the molecules of H and O. It is not the same object in two different epistemologically worlds: in one world it appears to be a macro-object, in another world “it” appears not as an object but as a bundle of objects. Something can be in one epistemological world a sum of entities; in other world it can be a property of one object with a different structure. Thus, the reduction or emergence processes means to pass from one epistemological world to another.

⁸ Each epistemological world has certain key elements that characterize it. In Vacariu *et al.* (2001) we introduce different key elements available for the cognitive science domain. One of the most important key elements is that of primitives. In terms of the present topic, each epistemological world has its own primitives.

⁹ I presented above different conditions of observation offered by the external and internal tools. However, the change of the observational conditions could take place in different ways. For instance, Einstein’s special theory of relativity upholds that if the speed of the observer increases the time is dilated and the space is contracted. This means that if a person travels with the speed closer to the speed of light he observes certain objects with much smaller sizes than a person that is not moving. Thus, they observe epistemologically different worlds.

In my perspective, the explanatory gap between mental and neural levels, *i.e.* between two epistemologically different worlds, has a more accurate sense. The internal tools do not grasp a spatiotemporal feature and thus the correspondence between a mental state and the areas of the brain is almost impossible to be made. Moreover, according to the third principle (P3), to the mental states and the subjectivity or consciousness experience correspond not only the most activated pattern but also the pyramid and the counterpart. In consequence, the explanatory gap is that practically it is impossible to identify the part-counterpart that corresponds to each mental state and to the subjectivity of the human observer.¹⁰ Even if from a neural perspective (or the third person perspective) both part and counterpart have a spatiotemporal structure, what such structure that corresponds to the phenomenal experience of one state or human subjectivity can be grasped by external tools as fMRI or PET?¹¹

The mental causation problem falls under the same terminological confusions. Commonly, it is the question of how the mental phenomena produce physical phenomena like moving the arm? Thus, a dilemma appears specified by Kim: M causes M*, P causes P*, and M* supervenes on P* (Kim, 1998). Kim offers an alternative: the functional model of reduction. Rejecting Nagel’s bridge laws and Davidson’s anomalous monism, he introduces the idea that many biological properties are construable as second-order functional properties over psychochemical properties. His perspective does not bring new causal powers (*i.e.* mental causation) into the world: mental causation is identical with physical causation. However, from our perspective there are the same causal relations among different states that are viewed in one or another epistemological world (neural or psychological epistemological world). The mental causation problem appears just because of the mixture of these epistemological worlds.

I am highly indebted for useful discussions and comments on the manuscript to John Bickle, Ilie Pârnu, Markus Peschl, Dalia Terhesiu and Michael Wheeler.

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¹⁰ Eliminative materialists (Churchlands) reject one of the epistemological worlds given by internal tools (folk psychology). The two epistemological worlds have the same epistemological status; they represent different sides of the same thing-in-itself. Objectivity in science is taught of as related to the spatiotemporal frame. Of course, it is much unambiguous to study an epistemological world given by external tools but mental states and subjectivity cannot be grasped by such tools.

¹¹ From my perspective Chalmers’ position is wrong when he claims that “conscious states have structure (...) But this structure is a distinctively *phenomenal* structure, quite different in kind from the spatiotemporal structure and formal present in physics. The structure of a complex phenomenal state is not a spatiotemporal structure (although it may involve the representation of spatiotemporal structure) (...)” (Chalmers, 2002, p. 260)

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