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## FREE WILL AND NEUROSCIENCE

**Peter Volek**\*

*Catholic University in Ružomberok, Faculty of Arts and Letters, Hrabovskácesta 1, 034 01  
Ružomberok, Slovakia*

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### **Abstract**

Many neurobiologists say that Biology teaches us that free will is only an illusion. Theology presupposes the free will of man as the condition of his responsibility. The origin of the problem is in the methodology of Biology and in her connection to other disciplines: can Biology connect with Psychology, Philosophy and Theology? Benjamin Libet says that the human act begins unconsciously and man can consciously veto or allow the free act. John Bickle wants to reduce Psychology and free will to Biology. I will argue that Biology connects Psychology and Theology on the level of Philosophy and that Libet's negation of the free initiation of human acts and Bickle's attempt to reduce Psychology and free will to Biology are not reasonable. The agent causation and the understanding of man as a substance with the powers of reasoning and volition is the metaphysical presupposition of free will. This understanding presupposes the realism of reason and will as the faculties of man and of his soul. Through the activation of these powers can the man as a substance act and initiate the new causal chain, because the effect of one cause in the nature can arise when no other event precludes them. The soul is in relation with the body as form is with matter.

*Keywords:* free will, neuroscience, Libet, realism, agent causation

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### **1. Introduction**

One of the greatest problems in contemporary thinking is the problem of free will. Many neurobiologists say that Biology teaches us that free will is only an illusion. The origin of the problem is in the methodology of Biology and in her connection with other disciplines: can Biology connect with Psychology, Philosophy and Theology? I will argue that Biology connects with Psychology and Theology on the level of Philosophy and that Libet's negation of free initiation of human acts and Bickle's attempt to reduce Psychology and free will to Biology are not reasonable.

### **2. Libet's neurobiological experiments**

In recent times the neurobiologist Benjamin Libet wrote that we are incapable of positive free acts; we are capable only of negative free acts in the

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\*E-mail: peter.volek@ku.sk , phone: +421 918 722007, fax: +421 44 4332443

form of a veto of unconsciously initiated movements. Libet states his position in this manner: “Voluntary acts are preceded by electrophysiological ‘readiness potentials’ (RPs). With spontaneous acts involving no preplanning, the main negative RP shift begins at about – 550 ms. Such RP’s were used to indicate the minimum onset times for the cerebral activity that precedes a fully endogenous voluntary act. The time of conscious intention to act was obtained from the subject’s recall of the spatial clock position of a revolving spot at the time of his initial awareness of intending or wanting to move (W). W occurred at about – 200 ms. Control experiments, in which a skin stimulus was timed (S), helped evaluate each subject’s error in reporting the clock times for awareness of any perceived event. For spontaneous voluntary acts, RP onset preceded the uncorrected Ws by about 350 ms and the Ws corrected for S by about 400 ms. The direction of this difference was consistent and significant throughout, regardless of which of several measures of RP onset or W were used. It was concluded that cerebral initiation of a spontaneous voluntary act begins unconsciously. However, it was found that the final decision to act could still be consciously controlled during the 150 ms or so remaining after the specific conscious intention appears. Subjects can in fact ‘veto’ motor performance during a 100-200 ms period before a prearranged time to act. The role of conscious will would be not to initiate a specific voluntary act but rather to select and control volitional outcome. It is proposed that conscious will can function in a permissive fashion, either to permit or to prevent the motor implementation of the intention to act that arises unconsciously.” [1]

Libet distinguished between RP I and RP II. RP I occurs when the movement was not pre-planned; RP II takes place when the movement was pre-planned. The first part of RP is 1.5-0.4 s before the movement. With pre-planned movement RP I is observed 1050 ms before the movement; with the spontaneous movement, it happens 550 ( $\pm 150$ ) ms before the motor act begins [1]. Libet gives the definition of a voluntary act as an act that occurs, “when (a) it arises endogenously, not in direct response to an external stimulus or cue; (b) there are no externally imposed restrictions or compulsions that directly or immediately control subjects’ initiation and performance of the act; ... (c) subjects *feel* introspectively that they are performing the act on their own initiative and that they *are free* to start or not to start the act as they wish” [1]. According to Libet [2], we should distinguish among decisions about what choice we have, what act we should do and what intention to do now. Decisions are not a voluntary act. Consciousness does affect the nerves through a conscious mental field, a concept explained in a later paper. It should be the system property of the elements of the neuronal activity that are potentially testable. Libet mentions what is potentially testable without realization: “A small slab of sensory cortex (subserving any modality) is neuronally isolated but kept viable by making all the cortical cuts subpially. This allows the blood vessels in the pia to project into the isolated slab and provide blood flow from the arterial branches that dip vertically into the cortex. The prediction is that electrical stimulation of the sensory slab will produce a subjective response reportable by the subject.” [3]

### **3. How to connect Neurobiology, Psychology and Philosophy**

Libet did not reflect on the connection between the Neurobiology, Psychology, and Philosophy that he used. This reflection should have preceded his use of them. Let us start with the analyses of the methodology of the possibility of the connection among Neurobiology, Psychology, and Philosophy. There are different sciences that use different concepts and methods. Cognitive neuroscience used by Libet is the synthesis of Cognitive psychology, Neuroscience and Neurobiology. We can find two models for the relation among these sciences. Let us call them 'theoretical' and 'functionalist'. The first of them was drawn by Ernst Nagel [4], the second is used by Kim and Bickle. The theoretical model is based on the understanding of the sciences as systems using theories. The relation among Psychology, Biology and Philosophy was preciously elaborated by Norwig. Philosophy should bring the theoretical framework that gives the possibility for the connection of Psychology and Biology. It should be a connection between two scientific systems so that they are grounded (1) on the various basic concepts and (2) on the fact that the two systems can function as closed systems [5]. Between these two theoretical systems there are three possible strategies to determine the connections: a) reduction, b) interaction, c) integration.

#### **3.1. Reduction**

According to Ayala, reduction is the relation between Biology on the one side and Physics and Chemistry on the other side. This arises in three domains: ontological, methodological, and epistemological. Let us see what these three domains mean [6]. Ontological reductionism reduces Biology to physics and Chemistry. Ayala understands this in the sense that all living beings are composed by physicochemical entities and processes. He claims that these are not immaterial principles or entities that some denote as a vital source or soul. According to Ayala, methodological reductionism holds that biological explanation should be located at the level of physicochemical processes. Epistemological reductionism according Ayala will take theories and laws of one science as deduced from theories and laws of another science.

My interest here is focused on ontological reductionism and antireductionism. Ontological reductionism, in the relation between Biology and Psychology, will reduce Psychology to Biology to Physics and Chemistry. This type of reduction is defended by physicalism. But reductionism is challenged by folk psychology. Folk psychology uses sentences in the first-person-perspective, what one person experiences and is only able to say, what one experiences when one expresses one's own mental states. The mental states can also include human voluntary decisions. Ontological reductionism holds that mental states reducible to the physical states. The eliminative materialism tries to eliminate the expressions of folk psychology and replace them with physical terms, e.g. the experience of the vanilla ice in the state of the brain, i.e. the electric voltage

in c-fibres in some part of the brain. Ontological reductionism pertains also to all theories of identity: token-identity or type-identity. Type-identity refers to the identification of types of mental states with the types of physical states. Token-identity means the identification of mental phenomena with the physical phenomena. The non-reductive physicalism defends ontological reductionism but claims that the descriptions for mental states cannot be reduced to the descriptions for physical states.

Against ontological reductionism I will argue for ontological antireductionism. From the action we can deduce the basis of some action. Mental states can be understood as effects of mental causes, and physical states as effects of physical causes. The diversity of the mental and physical causes will explain the distinction in the movements of muscle caused by voluntary activity and by physical cause, e.g. EMG (Electromyogram). By voluntary contraction of the muscle the stimulus is coming from the inside of the subject. It is a product of his decision. Using EMG, the muscle is contracted without a voluntary decision from the patient. This stimulus is coming from outside the subject. It is only a physical cause coming from the outside of the subject. The movement is done without the subject's decision. It is also an effect of another person whom the apparatus for EMG is plugged to. By mental action the muscle contracts due to the personal decision of the subject. This manifests the voluntary decision and action of the subject. When we cannot distinguish the mental and physical causes of the contraction of the muscle, then we cannot distinguish between his own contraction and contraction caused due to the EMG. The contraction of muscles caused by the EMG is used for the therapy of the damaged nerves. The contraction of muscles helps the revival of nerves and the reinforcement of the muscles.

Similar principles govern the EEG (Electroencephalogram), which can determine the new physical states through the electrical impulse from EEG [7]. The same contraction of the muscle can be achieved by voluntary decision or by EEG. The same physical state appears through different mental states. By reducing the mental states to the physical, we cannot distinguish between a cause from voluntary action and a cause from electric action. This is in contrast to common sense and medical therapy. This example shows that reductionism must be excluded in this case.

Functionalistic models comprehend mental states functionally, and as a consequence they are considered identical to physical states. Let us see what the solution to subjective experience according to functionalism. This solution is a prominent representative of the principle of supervenience as defended by Jaegwon Kim. The mental states are supervenient on the physical states, but the mental states constitute distinctive and autonomous domain. The principle of supervenience is accepted as the fundamental premise of the physicalism of the primacy of physical laws and domains without implicating the reductive physicalism. The principle of supervenience, though it means that the mental has its basis in the physical, can be combined with physicalism, emergentism, epiphenomenalism, and thus with minimal physicalism, since it cannot be

combined with Cartesian dualism. The principle of supervenience held by Kim accepts both ontological physicalism and mereological supervenience. The principle of supervenience [8] can be expressed in the following way:

- (1) There are only elementary physical elements, from which all things are built.
- (2) In man we find mental and physical properties.
- (3) Mental properties supervene on the physical properties.
- (4) Mental properties are realized through physical properties.
- (5) Functionalistic explanations of mental properties accept their correlation with physical properties and their identity.
- (6) Qualia cannot be explained in a functionalistic way.
- (7) Dualism of properties is in accord with physicalism.

The experience of free will, of one's own decision to contract the muscle, can be understood as aqualium. Qualia cannot be explained, according to Kim, with the help of physical terms such as functionalism. However, this explanation is not adequate. The functional explanation should be free of metaphysical presuppositions, but in this case it is not, while Kim assumes physicalism. The peculiar character of qualia within his solution is missing. While the substitution of the mental description through the physical description is missing, the meaning of the subjective experience cannot be comprehended within a physical description.

The possibility of the connection of neurobiology and psychology through epistemological reductionism is explored by Martin Norwig [5]. He reflected on Kim's thoughts on the problem of free will. Kim claims that two bridge-principles overcome the epistemological gap between the mental and physical in two-ways: (a) The definition of the mental with the help of the physical and (b) the empirical corroborated correlation laws [9]. It should be evident that Kim is walking in the footsteps of Ernst Nagel. Nagel argued for a reduction of one physical theory to another [4, ch. 11], but Kim extends this type of reduction to one that includes all sciences. It seems that this extension will presuppose reduction in the sense that the method of physics is extended to all sciences, which presupposes the strict nomological relation between mental and physical. This is in contradiction with the principle of multiple realization, which means that one mental state can be realized by multiple physical states. Kim criticizes Nagel's model because he uses the Hempelian model of scientific explanation for all sciences, which is extremely rare in Physics. Nagel uses the Hempelian D-N model (deductive-nomologic model), which "consists in the derivation of the statement describing the phenomenon to be explained from laws taken together with auxiliary premises describing relevant initial conditions" [8]. Nagel deduces one theory from another with the help of bridge laws as auxiliary premises. Nagel does not explain the bridge laws, but presupposes them as primitive and basic. According to Kim it does not explain why macro-phenomena emerge from micro-phenomena and its laws. Kim uses a functional model of scientific explanation. When mental phenomenon is realized through physical, it fulfils the function, of realization of physical properties. This is,

however, problematic, because it needs new definitions for central concepts and conversion of statistical laws into logical laws [5]. Therefore this strategy fails. Indeed, let us take a look at Norwig's example of a bridge between two scientific theories, namely the equivalence of the unit of heat and the unit of mechanical labour with a mathematical expressed relation as the bridge. Norwig postulated Mathematics as a bridge between Biology and Psychology. This implies that Mathematics allows for the precise formulation of laws of Psychology and Biology [5]. Nevertheless, Norwig's solution is also problematic, because in doing so he needs to use the method from one science for another science. This is problematic, because where Physics uses mathematical methods, it is doubtful that Neurobiology and Psychology do so too. The example that Norwig provides derives from Physics. In Physics, it is possible to use Mathematics as a bridge between disciplines of Physics. Norwig's presupposition is that in Biology and Psychology there are laws in a strict sense. Kim, on the contrary argues the laws of, Biology, Psychology, Geology, Cognitive science are different from physical laws and are perhaps not laws in a strict sense [10]. There are also no laws in a strict sense in Genetics. At the level of genes an irregular process can be started, because the cells have an idiosyncratic structure due to the individual variability of the cells [11]. To understand one scientific discipline as a science does not necessarily imply that its content can be fully explained by laws. It is sufficient to accept it as a science that has its own domain of research and its own scientific method. Let us assign the science with S, the system of sentences with ST, the domain of basic and deduced concepts with D and methodology of this science with M. We can then form this definition of Science: (1) "The science S is constituted by a system of sentences ST if and only if it uses its own domain of basic and derived concepts D and has its own methodology M."

Bickle proposes a different version of functionalism. According to him two presuppositions of philosophy of mind are false: (1) We do not know how the brain functions. (2) The lower level (brain) cannot explain the higher level (cognition and behaviour). He gives the proof of his propositions using example in which through electric stimulations of some areas in the brains of mammals are produced excitatory post-synaptic potentials (EPSP). It was a success to form long-term potentiation (LTP) to influence behaviour of mammals [12]. Experiments with various kinds of mammals confirmed social memory cognition consolidation. According to Bickle, we can expect to find molecular mechanism of broader social cognitive functions in cases where external stimuli cause mental initiation. For Bickle, Psychology is rather about behaviour than about causes. What might cause mental states lies rather on the research table of neuroscience [13]. Bickle understands Psychology in a restricted behaviouristic sense. Bickle understands his method as a metascientific analysis in the sense of being a reflection about Science. Thus it might be considered as a philosophy of Science. He builds his argument on an assumption not yet verified. It is similar to the presuppositions of eliminative materialism, which supposes that in the future it should be possible to substitute all mental terms with the physical terms without missing the meaning. This is not possible, because the subjective

experience expressed in qualia cannot be reduced to the physical without missing the meaning.

### **3.2. Interaction**

If we have to refute reductionism, there remain two possibilities to relate two sciences. Let us first look at ‘interaction’. According to Norwig, interaction between two sciences is allowed even when the domain of one science is not in direct contact with a domain of the other science. However, interaction may concern their laws or meanings of some of their concepts [5]. Norwig’s interest lies in the possibility to interact two theories on the same level, hence, such interacting cannot be applied to Biology and Psychology, for example. Thus we can leave this opinion aside. According to Norwig, the concept of the interaction between two sciences benefits of Henrik Walter’s idea of minimal metaphysical presuppositions for bridging neurobiological theories and philosophical concepts [5, 14]. Walter sees the connection between Neurobiology and Psychology through neurophilosophy. Walter [14] takes over the role plaid by neurophilosophy suggested by Thomas Nagel: “The main concern of neurophilosophy is to question and understand very common ideas about mental phenomenon in the neurosciences, or aided by Neuroscience, ideas all of us use every day without thinking about them” [15]

Walter designated basic theses of his conception of neurophilosophy in the following way: “Core Theses of Minimal Neurophilosophy

- (T1) *Ontology*: Mental processes of biological organisms are realized by or with the aid of neuronal processes.
- (T2) *Constraint*: Philosophical analysis of mental processes should not contradict the best currently available brain theories.
- (T3) *Heuristic Principle*: Knowledge about the structure and dynamics of mental processes can be gained from knowledge about the structure and dynamics of neuronal processes.” [14, p. 132]

However, the problem remains. When two sciences are so different that between them remains an epistemological gap, how can they build something in common? The epistemological gap means that between two sciences there are insuperable differences caused by different methodologies. Psychology (e.g. developmental psychology) uses the first person account for information about mental states (e.g. beliefs), but Neurobiology uses the third person account for information about physical states [16, 17]. The epistemological gap is mentioned by Martin Carrier and Jürgen Mittelstraß. They conclude that a reduction of Psychology to Biology is not possible [18]. They mean that it is not possible for two sciences to interact merely by themselves. They need a principle in order to bridge the epistemological gap. However, this is not possible concerning bridging Psychology and Biology, because the psychological theorems are not deducible from neurophysiological laws. The psychological theorems are statistical while the neurophysiological laws are deterministic. If a true

integration between two sciences is to be successful, they should accept a common methodology and a common set of basic principles and concepts.

### **3.3. Integration**

Libet's experiments and interpretations did bring about many positive and negative answers. Libet is one of the most quoted persons in this research area. Because the opinions of his papers are so widespread, it suffices to find the most important discussion about his thinking that shows the acceptability of his research. If the initiation of human acts according to Libet is not free, then our feeling of its initiation is only illusion and Psychology is reduced to Biology.

I will consider the four most significant deficiencies in the metaphysics of Libet's propositions. The first deficiency is exposed by one counterexample. It is enough to find one counterexample to show that his interpretation denying the idea of positive free will fails. Kadri Vihvelin's view about the possibility of free will is similar: "It is enough to describe cases of persons who have or act with free will with enough detail to make it plausible that these cases describe something that is really possible" [19]. Let us imagine a situation in which one is thinking about buying a new car. He has a clear idea about the colour of the car and the purpose for which he will use the car. He compares various types of cars, he visits several car shops and examines a number of cars. After a long deliberation he makes a decision and buys a particular car. So this is an example in which a human being makes use of the free will.

The second problem is Libet's understanding of action, in particular his idea of deliberation. Deliberation is not only an inner mental state. "... [I]n deliberation what I do pay attention to are the relevant features of the external world: the cost of the alternatives, the quality of food ... Deliberation is an active engagement with the world, not a process of introspecting our own consciousness of it ..." [20] Deliberation is used intentionally. It is molded out of the intentional act of the subject and its object. Intentional acts by deliberation are directed to something outside the subject. The context of an intentional act is greater than the context of its physical action as the wrist flexion in Libet's experiment. "For each trial, subjects were asked to perform a simple quick flexion of the wrist or fingers at any time they felt the 'urge' or desire to do so; timing was to be entirely 'ad lib', that is, spontaneous and fully endogenous" [1]. The flexion of the wrist or fingers can in many contexts acquire different meanings. Sometimes they can mean the heating through bodily movement, the overcoming of sleeping or the arranged signal to the partner. The wrist flexion without greater context in Libet's experiments is meaningless and not adequate for understanding the intentionality and volition.

The third problem is the inconsistency of the statements of Libet. According to Libet the initiation of the free act begins unconsciously, but his vetoing is done consciously. The unconscious initiation of a free act shows the interaction between the brain and the body. The initiation begins in the brain and the vetoing or the allowing of the free act is parallel with the brain processes.

The vetoing presents another model as is the model of the initiation of the free act [21].

The fourth objection to Libet's interpretation of his experiments is the critique of his use of the concepts, especially when he does not use the concepts adequately [22, 23]. He uses desires and intentions as synonyms. Intentions signify the wanting to do something. However, 'wanting' to do something does not imply doing that something. "In W series, the subject was asked to note and later report the time of appearance of his conscious *awareness of 'wanting' to perform* a given self-initiated movement. The experience was also described as an 'urge' or 'intention' or 'decision' to move, though subjects usually settled for the words 'wanting' or 'urge.'" [24] Libet's conceptual confusion led him to interpret of his experiments inadequately.

The integration of Biology and Psychology on a more abstract level occurs in Philosophy. Philosophy can provide the grounds that help explain human free will. The best explanation is that the exercise of free will is due to the agent causation, in which the agent through the execution of his decision begins the new causal chain [25]. The agent executes the intentional act after deliberation of two or more alternatives and the choice of one of them. Through his deliberation, he reflects upon the consequence of intentions. This is possible if we understand a human being in terms of a being with the powers of reasoning and volition, which include reason and will. These powers are activated in the process of deliberation and choice. Reason and will are real powers even though not activated. Reasons do not cause the acts; the initiator of the acts is the subject as the bearer of the powers of reason and will. The powers of the subject are immaterial, because reasoning uses universals acquired through abstraction. The best explanation for the unity of the subject is the hylemorphism. It means that the soul with its powers of reason and will is the form that forms the matter – the body of human beings. The body and the soul are united together as the matter and the form. A human being can initiate a new causal chain, because the event, as the effect of one cause, can occur when no other event precludes it [26]. Natural laws can be understood as metaphysically necessary [27], but the relation between cause and effect is not necessary, because the effect from one cause can in turn determined by another cause, including human action.

#### **4. Conclusions**

The neurobiologist Libet explains in his experiments that human beings begin their acts unconsciously. The counterexample and other objections to Libet's interpretation of his experiments led me to the conclusion that his idea about the unconscious underpinnings of free acting is not reasonable and acceptable. Additionally, Bickle's reductionism of Psychology to Biology is not acceptable, because of his eliminative materialistic presuppositions. The philosophical analysis of the metaphysical presuppositions of human action must lead to the adequate metaphysical explanation of a human being and her powers as well as of the intentionality as the possibility of her interaction with the world.

The best explanation is the hylemorphism, which means that reason and will, as the powers of a human being are the powers of the soul. For the soul is the form of the human body as matter. These powers are real without their activation, which means a realism of reason and will.

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