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Brain and Free Will

Gehirn und freier Wille

Zusammenfassung

In unserem täglichen Leben sind wir überzeugt, dass wir frei sind. Diese unmittelbare Überzeugung wurde von einigen Neurophilosophen in Frage gestellt, die behaupten, die Neurowissenschaften hätten bewiesen, die Freiheit sei eine Illusion. Diese Autoren beziehen sich insbesondere auf die Experimente von Benjamin Libet und von nachfolgenden Forschungsgruppen. Diese Experimente sollen gezeigt haben, dass die Entscheidungen für Willkürbewegungen im Gehirn unbewusst vorbereitet werden. Erst später würden wir uns dieser Entscheidungen bewusst und glauben irrtümlicherweise, dass sie von uns selbst getroffen wurden. Deshalb gebe es keine Freiheit. Unsere Handlungen sind verursacht durch Hirnprozesse. Verbrecher trifft keine Schuld, weil sie nach den Gesetzen der Kausalität handeln. Es wird gezeigt, dass diese Behauptungen nicht durch neurowissenschaftliche Daten bewiesen sind, sondern weltanschaulichen Positionen wie Reduktionismus und Naturalismus entspringen. Die neurowissenschaftlichen Daten können auch so interpretiert werden, dass sie mit dem richtigen Verständnis des freien Willens vereinbar sind. Der reduktionistische Naturalismus ist abzulehnen, weil die geistigen Wirklichkeiten nicht einfach auf physische reduziert werden können. Das philosophische Nachdenken über Freiheit zeigt, dass menschliche Personen frei sind, obwohl ihre Freiheit durch physische Bedingungen begrenzt ist.

Schlüsselwörter: Libet-Experimente, Naturalismus, epistemische Kluft, physische Bedingungen, Kompatibilismus

Abstract

In our daily life we are convinced that we are free. This immediate conviction has been challenged by some neurophilosophers who claim that freedom is an illusion. These authors refer to neuroscience data, in particular to the experiments of Benjamin Libet and several other research groups supposedly to have shown that decisions for voluntary movements are produced unconsciously in the brain. Only some time later we become aware of these decisions and believe erroneously that they were our own. As a consequence freedom does not exist; our actions are determined by brain processes. Criminals are not guilty because they just act according to the laws of causality. We show that these statements are not proven by neuroscientific data but result from ideological positions like reductionism and naturalism. Neuroscientific data can also be interpreted in such a way that it is compatible with the right understanding of free will. Reductionist naturalism has to be refuted because mental realities cannot simply be reduced to physical entities. A philosophical reflection on freedom shows that human persons are free although their freedom is limited by physical constraints.

Keywords: Libet-Experiments, Naturalism, Epistemic Gap, Physical Conditions, Compatibilism

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It is an elementary conviction of every one of us that we are free. We are convinced that we can decide which action we want to select from several possibilities and which action we want to refrain from. We are convinced that we are responsible for our actions and, can be guilty thereof. Democracy, legislation, religion and culture are based on this conviction. These various aspects are summarized when we talk about the image of man, *Imago hominis*.

Some authors claim now that this elementary conviction of freedom should be an illusion because brain research has proven that our actions are produced by unconscious brain processes. Even worse, the unconscious and uncontrolled brain processes lead us to believe that we are free although we are not free. It is now time to get rid of such illusions and to build up a new image of man. The consequences of this view extend into every domain of our culture.

Therefore, it is an important task to examine if the demand for a new image of man is justified. What is the real content of neuroscientific data without any ideological interpretation? Could this data perhaps be compatible with our basic convictions of freedom? If this should be the case, we shall try to apply some philosophical reflections on our basic conviction of freedom in order to see if neuroscience and freedom can be reconciled.

1 Basic Data of Brain Research

1.1 The Experiments of Libet

Some neurophilosophers claim that the experiments of Benjamin Libet have proven that freedom does not exist. Libet wanted to find out when conscious intentions of action appear and how these intentions relate to the time when actions are carried out. The subject should perform “a simple but sudden flexion of the wrist at any time he felt like doing so. He was asked not to preplan when to act; rather he should let the act appear ‘on its own’. ... He was also asked to associate his *first awareness* of his intention or wish to move with the ‘clock posi-

tion’ of the revolving light spot”.¹ From the vertex of the head of the subject the readiness potential (RP) was recorded.

The RP was discovered by Kornhuber and Deecke 1965.² It is a weak negative potential which can be recorded using electroencephalography. It starts approximately 800 to 1000 ms before a subject performed a voluntary act. The result of the experiment according to Libet was that “the brain initiates the voluntary process *first*. The subject later becomes consciously aware of the urge ... to act, some 350 to 400 ms after the onset of the recorded RP produced by the brain.”³ From these experiments some neurophilosophers concluded that actions are not produced by conscious decisions but by unconscious brain processes. Since free will requires consciousness, there is no free will.

This experiment seems to be simple, in reality, however, it is rather complex and gives rise to a number of questions.⁴ Libet asked his subjects to report the time when they became aware of the urge to perform the action. He identified this urge with a conscious decision. The subjects, however, did not have any alternative for their action. They could not decide *what* they wanted to do but only *when* they were going to execute the motor act. Several additional experiments were carried out later by other research groups who tried to eliminate the weak points of Libet’s procedure. It turned out that there was *neither a temporal nor a causal relation* between the symmetrical⁵ RP and the execution of the movement⁶.

More recent experiments⁷ were planned in such a way that the subjects had a choice. Various patterns were offered on a screen. As a function of the pattern presented on the screen a particular action should be carried out. Surprisingly the RP could be measured already before a pattern appeared on the screen and before the subject could make a decision. This implies that the RP does not determine the decision. Rather it represents a *general expectation* that a voluntary action should be carried out.⁸ This is the reason why Hans Kornhuber, who discovered the RP, called this poten-

tial *readiness* potential.⁹

The fact that the RP appears already before the awareness of the wish to act can be made understandable in the following way: The subjects had decided to participate in the experiment and to bend the wrist at any time. The repetitive execution of this simple movement can easily be handed over to the “executing organs”, i. e. the neuronal circuits in the brain. We know this situation in our daily life where conscious decisions are no longer necessary for repetitive actions which have become habits. Thus, the Libet experiments do not contradict the reality of freedom. Libet himself maintained his conviction of freedom because there was still “enough time in which the conscious function might affect the final outcome of the volitional process ... The conscious will could decide to allow the volitional process to go to completion, resulting in the motor act itself. Or, the conscious will could block or ‘veto’ the process, so that no motor act occurs.”¹⁰

1.2 The Experiments of Haynes

John-Dylan Haynes started a new series of experiments¹¹ because the previous experiments and their followers “have left a number of controversial questions open”¹². The subjects were asked to fixate on the center of a screen where a stream of letters was presented. When they felt the urge to do so, they had to decide between one of two buttons which should be pressed by the left or right index fingers. A response mapping screen with four choices appeared. The subjects indicated their motor decision by pressing a second button. The brain activity was measured using functional magnetic resonance imaging (fMRI).

This experimental design had several important improvements: The subjects had the chance to make a choice; and, analysis extended over a much longer period of time and measuring the activity in the whole brain. The results of these experiments are rather important. “Two brain regions encoded with high accuracy whether the subject was about to choose the left or right response prior to the con-

scious decision. ... The first region was in frontopolar cortex, BA10, ... a second predictive region” was “located in parietal cortex stretching from the precuneus into the posterior cingulate cortex”.¹³ The frontopolar cortex was the first cortical stage. Signals were present 7 s before the subject’s motor decision. “Taking into account the sluggishness of BOLD¹⁴ responses, the predictive neural information will have preceded the conscious motor decision by up to 10 s.”¹⁵ The authors conclude from their findings “that the earliest unconscious precursors of the motor decision originated in frontopolar cortex, from where they influenced the buildup of decision-related information in the precuneus and later in SMA”.¹⁶ The supplementary motor area (SMA) is the region where the lateral readiness potential (LRP) is generated.

Although Haynes and coworkers have made an important progress in their experimental design compared to Libet and his followers, the objection which we have to make with respect to their conclusions remains basically the same. At the beginning of the series of experiments the subjects had decided to observe the sequence of letters on the screen and to press either the left or the right button; without this decision the neuronal circuits would not have anything to work out. The frontopolar cortex does not prepare an action if it is not in charge of doing so. If subjects want to take part in the experiment correctly, it is not necessary to make conscious decisions on each particular phase of the experiment; that would lead to an overburdening of conscious processes. With the initial decision the further flow of actions can be delegated to unconscious neuronal activities; thus, a momentary decision has a long term effect. The brain does not work and decide autonomously without the self because it is not a separate entity. Rather it carries out my task and feeds the result into consciousness again. When we learn to play a new composition of music on the piano, the transition from a singular decision – this finger now – to a process decision – this phrase now – becomes clear.

2 Naturalism and Reductionism

2.1 Examples of Naturalistic Interpretations

Although the experiments presented above do not allow any philosophical conclusions, some neurophilosophers claim they have proven that free will does not exist: Free will is just an illusion. In reality it is the brain machine which takes decisions without our knowledge. The brain machine works according to the law of causality. Each decision is determined by physical causes. The decisions are taken unconsciously and are attributed to the conscious self only later. The conscious self believes erroneously that the decisions are taken by itself.

Those reductionist neurophilosophers not only interpret neuroscientific experiments incorrectly, they also become entangled in internal contradictions. On the one hand side they propagate the opinion that free will does not exist. Decisions are taken unconsciously by the brain and are thus produced by physical causes. On the other hand they appeal to us to accept their view. Only free persons, however, can accept or refuse such an appeal. Three examples may illustrate this contradiction. *Wolf Singer* says that we are determined by the wiring of the brain. Therefore, we should stop to talk about free will.¹⁷ *Hans Markowitsch* is convinced that our brain is determined by genes and environment. Therefore, we have no choice for our actions. Criminals cannot behave in a different way.¹⁸ On the other hand *Markowitsch* postulates that we should take care that only our good genes will become effective.¹⁹

The actual debate on pedophilia seems to be an attractive field, where one can argue about the reality of freedom. According to *Edgar Dahl* pedophilic criminals are not guilty. They just carry out the commands of the brain. The brain, however, is subordinated to causality and works in an entirely deterministic way. Therefore „there is obviously no room for free will and responsibility“.²⁰ In the same article, however, the author addresses many exhortations to our free will which are incompatible with a deterministically acting brain.²¹ Who should be able to follow such exhortations if he is not a free person?

The authors cited above not only contradict themselves; they also go far beyond the reach of neuroscientific data. Their statements are rather ideological in nature. Many neuroscientists, in particular those who work experimentally or clinically oriented, disassociate themselves from such ideologies. They are convinced that such ideologies are not justified by neuroscience.

2.2 Naturalism and Reductionism Defined

The rejection of freedom ultimately originates in reductionist naturalism. There are several versions of *naturalism*. The common denominator of these versions is the opinion that everything which exists should be accessible by methods of natural science, at least on principle.²² The naturalism is getting *reductionistic* if it tries to reduce entities of a higher level to entities on a lower level in such a way that the higher level is no longer required. For neuroscience this strategy means that mental acts should be reduced to neuronal processes. The result of such a reduction would be that mental activities could be explained by neuronal processes. In fact, the consequences of this procedure would be enormous. Psychology, psychiatry, philosophy and theology would no longer be competent for the understanding of man. They would be replaced by new disciplines like neurophilosophy, neurotheology, neuroethics and many others which claim their competence.²³

As pointed out already, the reductionist naturalism appears in various forms and shades. Our present arguments are addressed to the *radical ontological form* of reductionism.

2.3 Arguments Against Naturalism

2.3.1 Identity

The reductionist naturalism in its radical ontological form pretends that mental acts, „the phenomenal consciousness“²⁴, can be reduced to neuronal processes. Therefore, they ultimately can be explained by processes of the functional nervous system. That is why they are subordinated

to causality and thus determined by causal laws; a deterministic system, however, does not give room to free will. If the functional nervous system and the phenomenal consciousness are identical, the identity can formally be expressed by an *equivalence relation*. This means that the functional nervous system is not only necessary but also sufficient for the phenomenal consciousness; however, an equivalence relation cannot be stated. It is true that the nervous system is necessary for the phenomenal consciousness; all our mental acts do have neuronal correlates. The nervous system, however, is not sufficient because mental acts cannot be derived from neuronal processes.²⁵

2.4 Neuronal Correlates

From the following examples it can be seen that all our mental acts do have neuronal correlates: 1. If certain brain regions are injured, the corresponding conscious activities are no longer possible. 2. As long as certain brain structures are not yet developed during ontogenesis, the corresponding mental capabilities are not yet present. 3. The modern imaging techniques allow to visualize brain activities whenever mental activities are going on. These few examples justify the following *general statement*: *All the mental acts have a neuronal correlate*. We do not have any evidence that mental acts may take place in man independently of neuronal activities. In other words: In science there is no evidence for a dualistic view according to which a soul would produce mental acts independently of the brain.

When we talk about neuronal *correlates* we should be careful to avoid misunderstandings as if there were two different realities, a mind and its neuronal correlates which are in close mutual relationship. One could then be tempted to speculate, what correlates could be in terms of *ontology* and how they might interact with mental activities. If we look into the workshop of scientific research, however, we shall realize very soon that ontology of correlates is out of reach at present; only phenomena of hidden neuronal structures and processes are

known. For example, if we see activity over the Broca center using functional magnetic resonance imaging (fMRI) while the person is talking, the so called BOLD signal is measured.²⁶ It is an „index of brain activity composed of several variables, some of which are still incompletely understood. The BOLD signal reflects changes in the ratio of oxyhemoglobin to deoxyhemoglobin.“²⁷ These changes are somehow induced by neuronal activity. Which kind of neuronal activity? Which information is processed? Who are the partners in this information processing? What can be measured are phenomena produced by underlying processes which ultimately are unknown. Therefore, neuroscientific ontology of correlates is not feasible now or in the near future.

Thus we take for granted that every mental act correlates with neuronal processes; that reverse, however, is not true. Mental activities cannot be derived from neuronal processes. That can be made clear from numerous examples. We shall discuss here just two examples, the first of which refers to the Libet experiments. The readiness potential turned out to be of great interest for the debate on free will. It can be measured some time before voluntary actions will occur and seems to be correlated with the preparation of such an action. However, it is not possible to conclude from the presence of the readiness potential that a particular action will happen. The second example refers to monitoring of brain activities with modern functional imaging techniques when certain mental activities are carried out. While the subject is speaking, the Broca center is active; the reverse, however, is not valid. From the activity of the Broca center one cannot conclude *that* the subject is really speaking; the subject could just imagine to speak. All the more one cannot derive from activity of the Broca center *what* is spoken.

Thus, there is no identity of observed neuronal processes and mental acts. An indissoluble difference remains, an “epistemic gap” as Habermas has pointed out.²⁸ The immediate experience of our daily life cannot be reduced to a scientifically conceived brain.

2.4.1 A Vicious Circle

There is an additional difficulty. Those people who try to explain mental acts by neuronal activities using the radical reductionist procedure fall into a vicious circle or a *petitio principii*. If higher cognitive functions should be explained using the radical reductionist procedure, the procedure is circular because the explaining instance uses its own cognitive tools to explain itself.²⁹ The attempt to explain ourselves by means of neurobiology – conceived by ourselves – is a vicious circle, i. e. the explanandum is the prerequisite of explanation.³⁰

3 Philosophy of Freedom

3.1 The Concept of Freedom

Our deliberations have shown so far that a neurophilosophical reductionism cannot eliminate our daily life experiences and convictions. Thus, we have now to reflect upon these convictions in terms of philosophy.

Philosophy distinguishes between freedom of action (*Handlungsfreiheit*) and freedom of will (*Willensfreiheit*). *Freedom of action* means that the acting person is free from inner and outer constraints. Freedom of action is given when we can move around in the world without being hindered by anybody else. We can be devoted to any tasks we like or aim for any objectives. We can select from various possibilities. We can be at the start of a sequence of events which capacity is called *agent causality* in modern analytic philosophy.³¹

Freedom of will means that the will determines itself. The acting person is able to understand that what is morally good should be realized in adequate actions. By this insight freedom of will at the same time is *moral freedom* and the person, acting correspondingly, a *moral subject*. Moral subjects again are entitled to acknowledge *dignity* to each other. The fact that we are able to do what we should do according to moral insight is the basis for legislation in a constitutional state.

The free will wants to do what is good only because it is able to follow the reason which under-

stands that what is good should be done. On this ground Kant formulated the basic law of practical reason: “You should act in such a way that the maxim of your will could always and at the same time serve as principle for a general legislation.”³²

Free actions are not arbitrary actions. Rather they are determined by *reasons*. “Reasons ‘determine’ but do not ‘cause’ human actions. Human actions differ from physical events by their *intentionality*; human persons act because they intend to reach certain goals. Such a recognized and consciously selected goal, however, does not ‘cause’ their action; there is always the possibility to act differently.”³³

At this point we have to clarify a misunderstanding which plays a certain role in the ongoing debate on human freedom. Freedom does not act as a purely spiritual entity; rather it is anchored in our physical existence. *Aristotle* has already shown internal and external conditions of freedom.³⁴ Modern brain research has extended our knowledge of particular conditions which are due to the state of the brain. In medical practice it has become clear for quite a long time that freedom can be limited in numerous ways. From our human condition (*conditio humana*) it follows that freedom is not a purely spiritual reality; it also depends on the physical state of the person.

3.2 Incompatibilism and Compatibilism

An idealistic concept of freedom means that freedom is an origin by itself and not determined by anything else; it is able to start causal chains. For such a concept freedom and determinism are not compatible, *incompatibilism* does not take into consideration the conditions of our physical existence. It is inconsistent with our experience. “The subject of freedom is not the free will beyond every determination by nature, rather ... the human person as it is and as it has developed.”³⁵ The physical condition was an essential element already in the philosophy of freedom of *Aristotle* and *Thomas Aquinas*. A modern version of conditioned freedom has been worked out by *Peter Bieri*.³⁶

If one wants to find a more radical solution and

tries to harmonize freedom and determinism,³⁷ one ends up with *compatibilism*. Freedom and determination by neuronal processes in the brain should be compatible. Pauen and Roth with their “naturalistic theory of free will”³⁸ have tried to solve the problem of freedom and determination in the sense of compatibilism. Ultimately this theory reduces reasons to causes. Freedom is understood naturalistically from the perspective of highly complex brain processes; the problem is addressed unilaterally from the viewpoint of the brain. The proposed “naturalistic theory of free will” describes many natural correlates of freedom. The viewpoint of freely acting persons, however, is not really envisaged.

Thus, compatibilism does not solve the problem either. For Habermas e. g. it would be distressing if my decision would be determined by neuronal events, “in which I would no longer be involved as a position taking person: It would no longer be my decision. Only the unnoticed change from the first person to the third person perspective can produce the impression that the motivation of the action by understandable reasons builds a bridge to the determination of actions by observable causes. The concept of conditioned freedom does not support the precipitate ontological monism, according to which reasons and causes are two aspects of the same thing”.³⁹

3.3 The Epistemic Difference

Once again we have to maintain the following fundamental realities: Every mental act has a neuronal correlate; this is true for freedom, too. Nevertheless there is no equivalence between the functional nervous system and the phenomenal consciousness. From these observations it follows that neuronal processes are necessary for mental acts but not sufficient to deduce mental acts from these processes. Nevertheless human freedom does exist not as an absolute but a conditioned entity.

Neither incompatibilism nor compatibilism will solve the problem, an *explanatory gap*⁴⁰ does remain. Therefore, we have to live with an *epistemic dualism*⁴¹.

The perspective of the experiencing and acting subject (first person) cannot be reduced to the perspective of scientific description (third person). Both perspectives remain epistemologically different. It is true that we are free. Nevertheless conditions can be identified which influence our free decisions.

3.4 Limitations of Freedom

If neuronal correlates are lacking, free actions are not possible. This happens when the relevant brain centers are either injured or not properly developed during ontogenesis. This situation can be exemplified by the famous case of *Phineas Gage* whose forebrain was heavily injured by an accident. Gage survived but his moral capacities were drastically changed. “Gage was no longer Gage”.⁴² Later a number of other patients were analyzed who suffered from similar cognitive and behavioural disturbances. They had similar brain lesions. This syndrome was then called “Phineas Gage matrix”.⁴³ It is highly probable that such patients are no longer responsible for their immoral behaviour. In such cases sanctions will not succeed. If the physical prerequisites are not present, free will cannot act properly. In this respect findings of neuroscience have triggered important discussions on criminal responsibility of patients.

The reverse conclusion, however, is not valid: Not every immoral action is due to a brain defect as it is postulated by Gerhard Roth. He formulated the so called “paradox of guilt” (“Schuldparadoxon”) which says: “The more detestable a criminal action is, the more likely a neurological or psychological disturbance will be identified which diminishes or even excludes the criminal responsibility of this person”.⁴⁴ This paradox is not generally valid; there are also dangerous criminals who do not show any neurological defects. Therefore, each individual case has to be investigated carefully.

3.5 Freedom and Responsibility

The philosophical reasoning confirms our basic conviction that we are free; we are able to un-

derstand what is morally good and to act accordingly. Some neurophilosophers have questioned or even refused this freedom; their arguments turned out to be self-contradictory. Their claim that neuroscience has proven that freedom is an illusion does not correspond to reality. However, we have to maintain that freedom is not a purely spiritual entity but anchored in our physical existence. Free actions are possible only if the relevant brain functions work properly. This is known on principle for quite a long time. Neuroscience has worked out disturbing factors and pathological processes to a much greater detail, thus, freedom has its physical limits. Nevertheless, we are free on principle and, therefore, responsible for our actions.

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