

Neurobiological findings and free will: a philosophical perspective

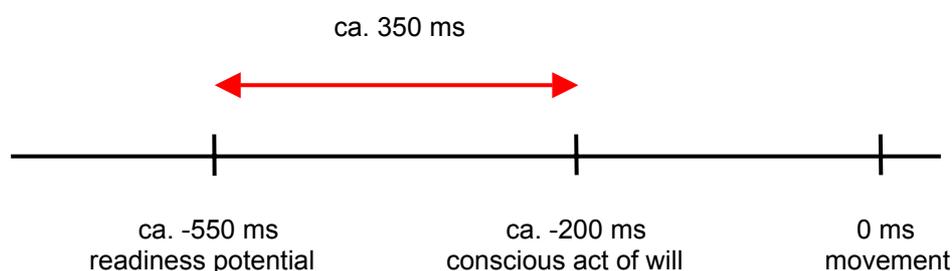
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1.

Recently, free will has been declared dead, but, of course, not for the first time. Something seems to be new, however. What is new is that this time the verdict comes from neuroscience. And the neuroscientists seem to feel certain that they have finished their cause. But is this feeling justified? Are the arguments put forward really sound? Let's have a look at the evidence.

The most prominent neuroscientific arguments are based on experimental findings known as the "The Libet experiments". The aim of these experiments was to investigate the relationship between the subjectively felt decision to act and the neuronal processes leading to the corresponding movements. Researchers carrying out Libet's procedure asked each participant to sit at a desk in front of an oscilloscope timer, attached EEG electrodes to the subject's scalp and instructed her to carry out some simple motor activity such as pressing a button, or flexing a finger or wrist, within a certain time frame. The subject was asked to remember the position of the dot on the oscilloscope timer when "he/she was first aware of the wish or urge to act" (Libet et al. 1983, 627). Pressing the button electronically recorded the position of the dot on the oscillator. By comparing the time of pressing the button and the subject's conscious decision to act, researchers were able to calculate the total time of the trial from the subject's initial volition through to the resultant action. On average, approximately 200 milliseconds elapsed between the first appearance of conscious will to press the button and the act of pressing it.

The most surprising outcome however resulted from analyzing the EEG recordings for each trial with respect to the timing of the action. It was noted that brain activity involved in the initiation of the action, primarily in the secondary motor cortex, on average occurred approximately 550 milliseconds *before* the trial ended with the pressing of the button. That is to say, researchers recorded mounting brain activity responsible for the resultant action as many as 350 milliseconds *before* subjects reported the first awareness of conscious will to act. Conscious decisions to act were *preceded* by an unconscious buildup of electrical charge within the brain, where this buildup came to be called 'Bereitschaftspotential' or 'readiness potential'.



Of course, these findings are surprising. Yet, what exactly do they entail? Do they really show that we are never free in what we will and what we do? Gerhard Roth, to name just one, says “Yes, they do.” Freedom, Roth argues, presupposes that our actions are caused by us, i.e., by an immaterial act of our will (Roth 436). But, he goes on, Libet’s results show conclusively that this is not the case. If a readiness potential can be recorded already 350 ms *before* the conscious act of will occurs, the decision to, say, press the button must have been made earlier, and since the act of will occurs 350 ms later, it cannot be identical to the decision in question. It cannot be our will that made the decision, it must have been the brain itself that made the choice. According to Roth, there is clear alternative – either it is our will that is responsible for our actions or our brain. And if it is the brain, the conscious act of will can at best be an epiphenomenon. Freedom presupposes that our actions are determined by our will, but Libet’s results show that our actions are determined neither by us nor by our will, but by our brain – thus, they show that we are never free in what we do.

Undoubtedly, a Cartesian picture of the mind is lurking in the background of Roth’s account of freedom. According to this picture, a self is an immaterial being, something that is not part of the natural order of the physical world. Freedom, therefore, is only possible if immaterial selves are able to intervene in the normal context of nature from outside.

Wolf Singer has put this idea in the following way:

“In our experience we are given to ourselves as free *mental* beings. But the scientific way of looking at things leaves no space for a *mental agent* of the kind of a free will which, if it is to result in deeds, would in some inexplicable fashion need to interact with our nerve cells.” (Singer/Wingert 2000 – italics mine)

If Roth and Singer were right, if freedom presupposed that there are immaterial selves with the capacity to intervene into the natural order of the world from the outside, I would concede that the findings of neuroscience are conclusive evidence against the existence of free will. But Roth and Singer’s premisses are more than doubtful. Cartesianism faces such an enormous amount of objections that we can reasonably assume that it is false. We should not think of selves as immaterial beings existing outside the natural world. Rather, we should acknowledge that, as living beings, persons are integral parts of this world. Persons, to put it bluntly, are animals – though animals endowed with cognitive capacities that, as far as we know, no other animals possess.

2.

However, if persons – if *we* – do not stand outside but rather are integral parts of the natural world, we immediately face the following questions: What could it mean in this case that sometimes at least *we* are the *authors* of our actions? And what could it mean in this case that sometimes at least we are *free* in what we decide and what we do? Let us start with the first question.

If naturalism is correct, i.e., if persons are integral parts of the natural world, their actions, decisions and considerations are natural events or processes that have natural causes, if they have any causes at all. However, naturalists do not deny that some actions are *my* actions, some decisions *my* decisions and some considerations *my* considerations. Yet, how can, say, a decision be *my* decision, if it is nothing but a natural process? How can I be the “author” of a decision, if it is not caused by me, but by other natural events? Part of the answer is that the term “author” is very misleading here if it is understood in the sense of agent causation. Does a cat chase a mouse, i.e., is it *the cat* which is doing the chasing, only if the cat is the cause of the chasing behaviour? Does a monkey reflect on how to get a banana only if the monkey is the author of this reflection in the sense that it brings it about in a causal way? No. Rather, one should say that matters are roughly as follows.

In the case of animals – and even in the case of certain robots – it is possible to distinguish between what an animal does and what happens to it. This is how we distinguish cases where a dog chases a rabbit from cases where it is forced away from its favourite tree by someone’s pulling the leash. The classification of movements as actions depends upon two features. First, the beings in question must have their own resources of energy and, second, they must be autonomous in the sense that their movements are determined by internal control mechanisms which are such that they (a) do not (like simple reflexes) always respond in the same way to the same kind of stimulus and (b) are not remote-controlled. In general, if the actions of animals are not simple reflex actions, this amounts to two things: (a) they can act in more than one way, and (b) the choice of the action which is actually performed is a matter of the animal’s *internal* control mechanism. Because, and to the extent that, animals’ actions are not mere reflex actions, a decision has to be made prior to every action. After all, there must be some way of determining which among the possible actions will be performed in the circumstances given. ‘Making a decision’ in this case means only that this or that action is initiated. If such a decision rests on the relevant internal control mechanisms, one may say that the animal itself has made the decision. If, however, someone intervenes from the outside and brings about a decision by way of, say, radio signals or other kinds of manipulative means, then this is an externally induced decision that was not made by the creature itself.

We thus arrive at a picture of reality according to which it is quite possible to say of beings that belong to the natural order that they themselves have performed a given action or taken a certain decision. According to this view the alternative ‘either me or my brain’ doesn’t exist, because a decision may be *my* decision, even if it is caused by neural processes. The decisive question is only whether these processes constitute an internal control mechanism of the right kind.

3.

Suppose a decision can be *my* decision although it is caused by a neural process. Then we still face the second question: Can this decision also be *free* if it is caused in this way? At first glance, this seems to be impossible. However, I think that the answer to this second question can also be “Yes.” To explain why, I have to go back a bit.

Philosophers are used to distinguish between freedom of action and freedom of will. We are free to act if we are able to do what we want to do. David Hume held the view that freedom, real freedom, amounts to nothing more than freedom of action: “By *liberty*, then, we can only mean a *power of acting or not acting, according to the determinations of the will*; that is, if we choose to remain at rest, we may; if we choose to move, we also may. Now this hypothetical liberty is universally allowed to belong to every one, who is not a prisoner and in chains.” (*Enquiry Concerning Human Understanding*, sec. 8, part 1, 159)



David Hume
1711-1776



Thomas Reid
1710-1796

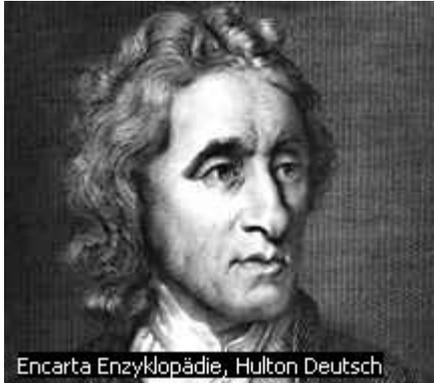
However, already Thomas Reid insisted that freedom to act is not enough. We must not only be able to do what we want to do, we also must have the ability to determine our own will, if we are to be really free. That Reid was right can be shown by the case of a drug addict. There is a sense in which a drug addict can do what he wants to do. He is free in his actions in the sense that (we shall suppose) he is able to take drugs whenever he wants to take drugs. The drug addict is not subject to any kind of external force. Internally, however, he is controlled by a form of compulsion, and therefore he is not free in his decisions – his will leads a life of its own, as it were. Even if he wanted to decide differently, his desire to take drugs would prevail. A drug addict is, so

to speak, at the mercy of this type of desire. What he lacks is *free will*.

As we have seen, freedom of action is the ability to do what one wants to do and freedom of will the ability to determine one’s own will. But what does it mean to say that someone has the ability to determine his own will? From a naturalist point of view, it cannot mean that the subject as an immaterial self can cause her will to be this way or that way. But if this is *not* what is meant, what is meant?

I think it may be helpful to recall what John Locke said in chapter 21 (“Of Power”) of the second book of his *Essay concerning Human Understanding*. Locke’s first answer to the question what determines a man’s will is that the will is naturally determined by “the most pressing uneasiness” (§ 40). This, however,

is not the full story. For, as Locke says, human beings are not simply *driven* by what they feel to be the most pressing uneasiness; in most cases they have the capacity to *pause* before acting and to *reflect on* what they ought to do in this situation, what would, from a moral point of view, be the right thing to do or what would best promote their well-considered self-interest.



John Locke
1632-1704

“There being in us a great many *uneasinesses* always solliciting, and ready to determine the *will*, it is natural, as I have said, that the greatest, and most pressing should determine the *will* to the next action; and so it does for the most part, but not always. For the mind having in most cases, as is evident in Experience, a power to *suspend* the execution and satisfaction of any of its desires, and so all, one after another, is at liberty to consider the objects of them; examine them on all sides, and weigh them with others. In this lies the liberty Man has; [...] we have a power to *suspend* the prosecution of this or that desire, as every one daily may Experiment in himself. This seems to me the source of all liberty; in this seems to consist that,

which is (as I think improperly) call'd *Free will*. For during this *suspension* of any desire [...] we have opportunity to examine, view, and judge, of the good or evil of what we are going to do; [...] and 'tis not a fault, but a perfection of our nature to desire, will, and act according to the last result of a fair *Examination*.” (§ 47)

According to Locke, then, free will rests on being capable to pause before acting and to consider what ought to be done in the situation at issue and what reasons favour one alternative rather than another. Our will is free if we have two decisive capacities – first the capacity to *pause* before making a decision and to *deliberate* about what would be the right thing to do in the situation given, and second the capacity to decide and to act in accordance with the result of this deliberation.

It is one of the great advantages of this view that it squares nicely with the case of the drug addict. What the addict complains about is that, even though he knows that his addiction will ruin his health, he cannot help taking drugs. What he lacks is the ability to choose what, according to his own judgment, appears the right thing to choose. He may have the ability to reflect and to understand that what he does will harm himself and may possibly be immoral. But that remains without influence on his decisions. These decisions are determined by circumstances that cannot be influenced by considerations of this type. What the drug addict lacks is the ability to decide in accordance with the results of his deliberations.

4.

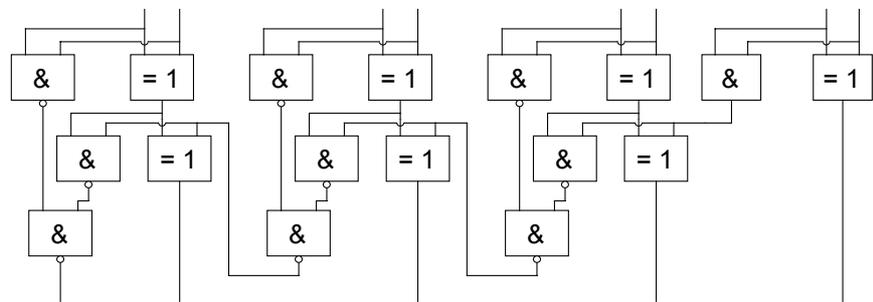
Let us assume that Locke is right, that free will rests on the capacity to *pause* before making a decision and to *deliberate* about what would be the right thing to do, and on the capacity to decide in accordance with the result of this delib-

eration. Does the naturalist gain any advantage from embracing this view? Does it not immediately lead to the conclusion that we are never free in our decisions *if all these decisions rest on neural processes*? How can we possess Locke's decisive capacities, if our will is determined by what goes on in our brains?

I don't think the situation is that desperate. But before we see why, let us first make one thing quite clear: As Locke already pointed out, there can be no reasonable doubt that sometimes at least we can be affected by considerations and arguments. Suppose I am lying in bed and the alarm clock starts ringing. I really ought to get up, for in an hour from now the faculty board will meet. On the other hand, it's been late last night and it would be nice to remain in bed. When I am just about to decide to stay in bed, a colleague of mine calls. "You have to attend to the faculty meeting. An important election will take place and your vote may be decisive." There is no doubt that the phone call, i.e., the argument put forward by my colleague, can influence my decision. Otherwise there would be no reason for her to give me a call at all. Thus, there is only the following alternative – either not all decisions rest entirely on neural processes or there are at least some neural processes that are sensitive to arguments.

I am convinced that the latter is true. But how can it be true? How can neural processes be influenced by arguments? The answer lies in a well-known fact, the consequences of which, however, are scarcely noticed: the fact that many physical processes admit of multiple descriptions. Take e.g. computers. At first, the aim of these electronic devices was to compute the results of certain mathematical functions – the sum, product, or quotient of two integers, the square of a real number, etc. But how could they accomplish this task given that they are just electronic devices, i.e., nets of transistors which, given a certain electronic input, produce other electronic impulses as outputs. Turing's great ideas rest on the observation that when *we* compute the sum of two integers by using pencil and paper our computing is a physical process – physical marks appear on the paper in certain order until finally the mark of the sum is produced. To construct a computer is just to build an electronic device which produces corresponding electronic marks in

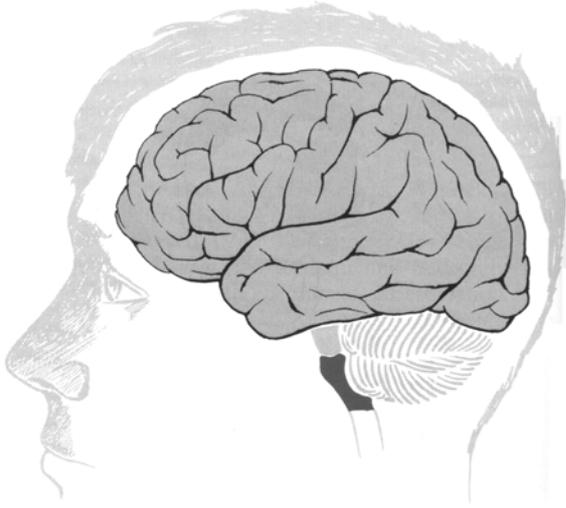
the same, or an equivalent, order. Starting from electronic states standing for the two terms of a sum, new states are produced in an algorithmic way until



circuit diagramm of a 4-bit adding device

finally an electronic state is reached that stands for the sum itself. This does not sound very spectacular. But the implications are important. In a sense, in a computer we find nothing but electronic processes. Yet, some of these processes *are* (at the same time) processes of computing the sum of two integers, and com-

puters show that there is nothing miraculous about this. There doesn't have to be a little homunculus inside doing the computing. The physical device itself suffices to do the job.



The same, or something very similar, is true with regard to brains. On the one hand, brains are huge aggregates of multiple connected neurons that fire at a certain rate and by so firing affect the firing rates of other neurons. On the other hand, the firing of certain neural nets *is* (at the same time) the perception of a certain face, the recall of a situation in the past, or the decision to raise the arm. That, at least, is what cognitive neurobiologists tell us. But if this is correct, it is only a small step to the further

assumption that even our deliberations and weighings of reasons have a neural basis. In other words: That a certain process is a neural process in no way precludes that the very same process *is* a process of deliberating about what would be the best thing to do. Of course, this implies that neural processes can be affected by reasons and arguments. Is this conceivable?

Already Hubel and Wiesel found so called “edge detectors” in our brains, cells in the cortex that do not simply respond to the presence of light, but rather to the presence of edges in their region of the visual field. Furthermore, cells were found that fire only in the presence of a vertical edge at a particular location in the visual field, while other nearby cells respond to edges of other orientations in the same region of the visual field, and such orientation-sensitive cells were found all over the visual cortex.

More recent research has proved that there are more complex cells that are sensitive to particular faces or to certain kinds of food or to other features of the environment. Moreover, we have any reason to believe that there are also meaning-sensitive neurons in the brain, for not only we, but also our brains react quite differently in response to an utterance of the words “fire” and “free beer,” respectively. And this is not only because “fire” and “free beer” differ syntactically. For not only we, but also our brains react quite *similarly* to the utterance of “fire” and “there is something burning”. That is, our brains react differently if the words uttered differ in meaning and similarly if these words have a similar meaning.

In the same vein, we have any reason to believe that there are neural processes that are sensitive to reasons and arguments. If my colleague gives me a call and says: “You have to attend to the faculty meeting. An important election will take place and your vote may be decisive,” then that may affect my behaviour. But this, it seems to me, is only possible if her argument can have an affect on the neural processes in my brain that lead to this behaviour.

It is time to sum up. We started from the assumption that persons are not immaterial beings existing outside the natural world, but rather, as living organisms, integral parts of this world. This assumption, however, lead to the question of what could it mean in this case that sometimes at least we are *free* in what we decide and do? The first part of the answer we found in Locke's considerations on free will. Persons are free in their decisions if, first, they are able to *pause* before making the decision and to *deliberate* about what would be the right thing to do, and if, second, they have the capacity to decide in accordance with the result of this deliberation. But this view immediately lead to a second question. How can persons, as living beings, possess Locke's capacities if all their decisions and all their actions have a neural basis?

As a naturalist I have a straightforward answer to this question. Some neural processes are at the same time processes of deliberating and decision making as is proved by the fact that these processes are sensitive to reasons and arguments. All capacities human beings are endowed with have a physical basis – the capacity to breath as well as the capacity to speak, the capacity to reproduce as well as the capacity to think. All the evidence available supports the view that all our cognitive capacities are based on the structure and functioning of our brains – the capacity to see as well as the capacity to remember, the capacity to speak as well as the capacity to deliberate. This, however, does not preclude that sometimes at least our decisions and actions are free. On the contrary, we are free insofar as we possess these capacities. The fact that they all have a neural basis is not at all at variance with our having a free will.

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