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DOSSIER

Brain as agent and conscious mind as action guide: from Libet-style experiments to necessary conditions for free will

Cérebro como agente e mente consciente como guia de ação: experimentos estilo-Libet e as condições necessárias para o livre-arbítrio

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ABSTRACT

Many neuroscientific experiments, based on monitoring brain activity, suggest that it is possible to predict the conscious intention/choice/decision of an agent before he himself knows that. Some neuroscientists and philosophers interpret the results of these experiments as showing that free will is an illusion, since it is the brain and not the conscious mind that intends/chooses/decides. Assuming that the methods and results of these experiments are reliable the question is if they really show that free will is an illusion. To address this problem, I argue that first it is needed to answer three questions related to the relationship between conscious mind and brain: 1. Do brain events cause conscious events? 2. Do conscious events cause brain events? 3. Who is the agent, that is, who consciously intends/chooses/decides, the conscious mind, the brain, or both? I answer these questions by arguing that the conscious mind is a property of the brain due to which the brain has the causal capacity to interact adaptively with its body, and trough the body, with the physical and sociocultural environment. In other words, the brain is the agent and the conscious mind, in its various forms - cognitive, volitional and emotional - and contents, is its guide of action. Based on this general view I argue that the experiments aforementioned do not show that free will is an illusion, and as a starting point for examining this problem I point out, from some exemplary situations, what I believe to be some of the necessary conditions for free will.

Key-words: Agent Brain, conscious mind, free will, Libet-style experiments.

RESUMO

Muitos experimentos neurocientíficos, baseados no monitoramento da atividade cerebral, sugerem que é possível predizer as intenções/escolhas/decisões de um agente antes que ele mesmo as conheça. Alguns neurocientistas e filósofos interpretam os resultados desses experimentos dizendo que o livre-arbítrio é uma ilusão, visto que é o cérebro e não a mente

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consciente que intenciona/escolhe/decide. Assumindo que os métodos e resultados desses experimentos são confiáveis a questão que se coloca é se eles realmente mostram que o livre-arbítrio é uma ilusão. Para tratar desse problema, argumento que primeiramente é necessário responder três questões referentes à relação entre mente consciente e cérebro: 1. Eventos cerebrais causam eventos conscientes? 2. Eventos conscientes causam eventos cerebrais? 3. Quem é o agente, isto é, que intenciona/escolhe/decide conscientemente, a mente consciente, o cérebro ou ambos? Respondo essas questões argumentando que a mente consciente é uma propriedade do cérebro devido à qual o cérebro tem a capacidade causal de interagir adaptativamente com seu corpo e, através deste, com o ambiente físico e sociocultural. Em outras palavras, o cérebro é o agente e a mente consciente, em suas várias formas - cognitiva, volitiva e emocional - e conteúdos, é seu guia de ação. Fundamentado nessa visão geral, argumento que os experimentos acima mencionados não demonstram que o livre-arbítrio é uma ilusão, e proponho, a partir de situações exemplares, o que acredito serem algumas das condições necessárias para o livre-arbítrio.

Palavras-chave: Cérebro agente, mente consciente, livre-arbítrio, experimentos estilo-Libet.

Introduction

Let us assume that the analysis of brain activity, using brain monitoring technologies - electroencephalography (EEG), functional magnetic resonance imaging (fMRI), positron emition tomography (PET), magnetoencephalography (MEG) etc. -, makes it possible to predict a person's conscious *intention*, choice and *decision*.[2] In other words, let us say that, from examining the brain events of a subject *A*, an experimenter *B* would be able to predict both *which* action *A* will choose among alternatives previously presented to him, and *when A* will consciously decide to initiate the chosen action. To be more precise, let us suppose a scenario where, from monitoring *A*`s brain activity, the experimenter *B* knows, before *A*, not just when *A* will consciously decide to move one of his fingers to press a key, even more, that *A* will consciously choose to move his right index finger, instead of moving his left index finger. If that is possible, the following question arises: Did subject *A* act with free will?

Often, human beings believe that their will is free when they feel that they *have control over* their conscious intentions/choices/decisions, as in situations in which they do not feel coercion, compulsion or automatism. This belief is usually associated with a dualistic view of conscious mind and brain relationship, according to which the subject, who perceives himself as a conscious subject - and not as a brain -, believes himself to be something distinct and irreducible to his brain.[3] Experiments such as those mentioned above - Libet-style experiments[4] -, have been used to criticize this also commonsensical dualistic belief in free will, as they "demonstrate" that it is the brain of the conscious subject, and not the conscious subject himself, that controls the conscious intentions/choices/decisions. According to this criticism, the conscious subject, being unable to control the preceding brain events, could not control the conscious intentions/choices/decisions caused by those. Being the conscious subject treated as a puppet of his brain, his free will is thought to be an illusion.

My first goal in this paper is to evaluate if this conclusion follows from its premises. In other words, assuming that Libet-style experiments[5] show that brain events temporally precede conscious intentions/choices/decisions, does this imply that free will is an illusion? This is a problem, whose solution will be based on the answers that I will propose to the following questions (taking Libe-style experiments as a guiding thread): 1. Do brain events cause conscious events? 2. Do conscious events cause brain events? 3. Who is the agent, that is, who consciously intends/chooses/decides, the conscious mind, the brain, or both? After answering these three questions in the next section, arguing that the brain is the agent and the conscious mind is its guide to action, I will address, in the section after the next, the main problem above, focusing on the *necessary conditions* for free will.

[2] I will use the terms "intention", "choice" and "decision" with the following meanings: "intention" means "what the conscious agent proposes himself to do"; "choice" means "the choice among one of the presented alternatives"; "decision" means "the choice of the moment when the chosen action starts". The term "will", constitutive element of the expressions "freedom of the will" - free will -, is related to the previous terms since that what is at issue is whether the voluntary intention, choice and decision are free.

[3] In its most extreme version, the dualism of substance, the conscious subject considers himself as a soul, that is, an immaterial (non-physical) substance, distinct and independent from the body to which she is connected. The body, being a material (physical) thing, works mechanically, like the gears of a clock, or the universe itself, with its laws that allow the prediction of material (physical) events. Free will would be a capacity of the immaterial (non-physical) soul, which is not subject to deterministic laws.

[4] This is a schematic summary of several experiments in neuroscience, which intend to demonstrate that it is possible to predict the conscious intentions/choices/decisions from monitoring and/or manipulating the brain. The most famous are the experiments by Benjamin Libet (1985), Chun Siong Soon (2008) and John-Dylan Haynes (2008, 2006), whose main articles are referenced in the end of this paper.

[5] I will not discuss the details of Libet-style experiments and the interpretations of their results; that have been done by very qualified neuroscientists and philosophers. Assuming that some of the results of these experiments are compatible with a non-reductionist physicalist approach to the relationship between conscious mind and brain - as I will argue in this paper -, my purpose is to examine the implications of those for the question of free will.

1. Brain as Agent and Conscious Mind as a Guide of Action

I will assume that Libet-style experiments are *consistent* with the view that brain events cause conscious mental events - upward causation - insofar as they show that particular brain events temporally precede the subjects' conscious intentions//choices/decisions. I will also assume that these experiments are *consistent* with the view that conscious mental events cause brain events - downward causation - insofar as they show that the subject's conscious intentions/choices/decisions temporally precede brain events causally responsible for the fulfillment of his voluntary action. From these assumptions, I will address the following question. If unconscious brain events *X* temporally *precedes* conscious intention/choice/decision *Y*, and *Y* temporally *precedes* an unconscious brain event *Z*, which *causes* the movement of the left index finger, what would be the cause of *Z*: *X*, *Y* or *X/Y*?

Answer 1: *X* causes *Z*, that is, brain events *X*, which causes the conscious intention/choice/decision *Y*, also causes the brain event *Z*; this means that conscious intention/choice/decision are epiphenomena of the brain. This answer is based on two hypotheses. First, *X* - brain events - is enough to explain *Z* - brain event -; *Y* - conscious event - is not necessary to explain *Z* - brain event. Second, explanation based on conscious events are unintelligible; conscious events do not fit in the sequence of brain events. It could be argued against this epiphenomenist view that it not just contradicts our subjective experience of being the conscious authors of our actions, but it also undermines our intersubjective explanatory practices based not just on conscious intentions/choices/decision, but also on conscious sensations, beliefs, wishes, emotions etc.

Answer 2: *Y* causes *Z*, that is, the conscious intention/choice/decision *Y*, caused by brain events *X*, causes *by itself* the brain event *Z*. The main criticism on this view was mentioned above: conscious events are not necessary to explain brain events, and do not fit in the sequence of brain events. Besides, it does not make sense to argue that conscious events have causal power *by themselves*, that is, apart from the brain, insofar as they are properties of the brain, and not properties of a Cartesian substance. Strictly speaking, there is no downward causation of the conscious mind over the brain.

Answer 3: *X/Y* cause *Z*, that is, together, brain events *X* and the conscious intention/choice/decision *Y* cause the brain event *Z*. In order to explain how *X/Y* together cause *Z*, I propose that *Y* be considered a property of *X* due to which *X* has *causal capacities* (*power to do things*) that it would not have without *Y;* in other words, consciousness, in its different forms - cognitive, volitive, emotional - and contents, is a property of the brain due to which the brain has causal capacities that otherwise it would not have. Being the brain embodied, many of its capacities related to its conscious experiences depend on the organs and members of its body, which allow it to consciously interact with - receive information and act on - the external environment; the brain also consciously interacts with - receive information and act on - its own body.

Let us see some examples. Visual consciousness is a property of the brain due to which the brain has the causal capacity to move its body safely in external environment. Auditory consciousness is a property of the brain due to which the brain has the causal capacity to enjoy a song. Taste consciousness is a property of the brain due to which the brain has the causal capacity to select a good wine. Olfactory consciousness is a property of the brain due to which the brain has the causal capacity to identify a rotten food. Tactile consciousness is a property of the brain due to which the brain has the causal capacity to read a Braille text. Nociceptive consciousness is a property of the brain due to which the brain has the causal capacity to avoid damaging stimuli to its body tissues. What was said about conscious bodily sensations also applies to other forms of consciousness such as: cognitive consciousness - intention, decision, belief, memory, imagination -, emotional consciousness - fear, sadness, love, hate, guilt, pleasure, displeasure -, and volitional consciousness - wishes.

These conscious properties, due to which the brain has causal capacities that it otherwise would not have, are used by the brain as *guides for its voluntary action*; therefore, they are not just epiphenomena of the brain. Let me try to clarify this hypothesis with an example: a piano recital given by pianist *A*. *A's* brain has the *conscious intention* of playing the piano, *consciously chooses* the music to be performed, *consciously decides* and *initiates* the motor activity involving his whole body, especially his arms, hands and fingers. Although this motor activity responsible for the production of sounds is to some extent automatic, conscious proprioception is used by the brain as a guide of action throughout the presentation. Even clearer is the role of auditory consciousness as a brain action guide. Without auditory consciousness, *A's* brain would not only have serious problems in mastering the flow of its presentation; it would not even have learned to play piano, considering that it would not be able to associate bodily movements - hands, fingers etc. - consciously felt to sounds consciously heard.

Applying the explanatory scheme just proposed to Libet-style experiments, the relationship between brain and conscious mind could be roughly explained in the following terms: 1. *A's* brain has the *conscious intention* to take part in the experiment according to the experimenter's instructions; brain event *X1* causes the conscious intention *Y1*. 2. *A`s* brain consciously choose to move its left index finger; brain event *X2* causes the conscious choice *Y2*. 3. *A`s* brain consciously decides to initiate that action so causing the movement of the left index finger; brain event *X3* causes the conscious decision *Y3*, and taking that as a guide, causes the brain event *Z*, which causes the movement of the left index finger. Notice that *A's* brain not just causes its conscious intention/choice/decision from its interaction with the experimental context; *A`s* brain also uses that conscious

events as a guide for its actions throughout the experiment.[6] It is the A`s brain who conscious interact whith its body and external physical and sociocultural environment, not just receiving informations that it makes conscious, but also consciously intending/choosing/deciding, and using the conscious intention/choice/decision as guide to its actions. A`s brain is not just the conscious "patient", it is the conscious agent.[7]

2. Agent Brain and Free Will

Having interpreted Libet-style experiments from a view on the relationship between brain and conscious mind according to which the conscious mind is both a brain`s property and brain's guide of action, the challenge now is to answer the question initially proposed, namely: is free will an illusion? To answer this question, I will first take a less ambitious path, which is to examine the *necessary conditions*[8] for free will, that is, to reflect on the minimum requirements without which free will would be more or less limited. I will assume that when it comes to necessary conditions the free will should not be treated as an *all or nothing*, but rather in terms of degrees, knowing that it would not be possible to offer a precise mesure to each case. Considering that a reflection on necessary conditions for free will must take into account the involvement and interaction among conscious emotional, volitional and cognitive events, both properties and guides of brain`s action, I will first treat each one of these conscious events separately, looking for identifying on paradigmatic examples what would be the necessary and damaging conditions for free will. After I will take them as a whole, and in the following, based on the same principles, I will make some comments about free will and sociocultural environment.

I will start with conscious emotional events, taking *conscious fear* as a paradigmatic case. A conscious fear, that is, a conscious fear resulting from an adaptive assessment of risk, used by the brain as a guide to its intentions/choices/decisions, which the brain feels to control, is a *necessary condition* for free will. The same could not be said about conscious fear resulting from a non-adaptive assessment of risk such as the *absence* of fear in situations of high risk, or the *excess* of fear in situations of low risk - *damaging conditions*. It does not seem that a brain has control over its conscious intentions/choices/decisions when, due to structural/functional casualties, it has *no conscious fear*, so exposing itself to very risky situations, such as walking alone in places where the rate of robberies and murders is very high. It also does not seem that a brain has control over its conscious intentions/choices/decisions when, due to structural/functional casualties, it experiences *extreme conscious fear*, so fleeing from situations where the risk is very low, such as get in an elevator, traveling by plane and go to a supermarket.

Let me now consider the conscious volitional events, taking *conscious will* as a paradigmatic example. A conscious will, that is, an adaptive conscious will, used by the brain as guide to its conscious intentions/choices/decisions, which the brain feels to control, is a *necessary condition* for free will. The same could not be said about cases of *absence* of conscious will in situations where it is necessary for survival, and *excess* of conscious will - compulsions - that endanger life - *damaging conditions*. It does not seem that the brain has control over its intentions/choices/decisions when, due to structural/functional casualties, it has *no desire* to get out of bed, to eat, to work etc., for a long period of time. It also does not seem that a brain has control over its intention/choice/decision when, due to structural/functional casualties, it *compulsively* performs actions such as those related to addictions: drugs, gambling, sex etc.

As paradigmatic examples of conscious cognitive events, I will use *conscious perception and memory*. A conscious perception and memory, that is, an adaptive conscious perception and memory, used by the brain as guide do its intentions/choices/decisions, which the brain feels to control, is a *necessary condition* for free will. The same could not be said about non-adaptive conscious perception and memory, such as cases of *absence* of conscious perception and memory in situations where they are necessary for survival, and *excess* of conscious perception and memory that might endanger the life - *damaging conditions*. It does not seem that a brain has conscious control over its intentions/choices/decisions in cases of total blindness - visual absence - and schizophrenia - visual hallucination; the same could be said about memory in situations such as Alzheimer`s disease - memory default - and hyperthymic syndrome - memory excess.

Although conscious emotional, volitional and cognitive events have been considered apart from each other, in general

[6] The brain of subject A, like all brains, has a history, that is, each conscious subject/person is, at each moment of its history, an effect of the structure and functionality of his brain - there is no subject/person apart of its brain -, which are constructed by biological processes involving genetic programs, and by unconscious and conscious interactions with its body and through its body with the external physical and sociocultural environment.

[7] I have argued in other texts, from the paradigmatic cases of visual and pain consciousness, that the brain is the agent and the conscious mind, resulting from its interaction with the body in which it is embodied and, through its body, with the environment external in which it is situated, is its guide of action. I defended that the agent is not a Cartesian person, that is, a conscious substance separable and independent of the brain, from where it would receive stimuli and over which it would act. I assume that a person, constituted by conscious sensations, memories, imaginations, beliefs, desires, emotions, etc. is inseparable from, dependent and instantiated on the brain; in this sense it is as a conscious and self-conscious person that the brain interacts with the body and, through it, with the external physical and sociocultural environment.

[8] Whether the necessary conditions for free will are also its sufficient conditions is an issue to which I will return in the end of this paper.

they are intertwined as the following situation illustrates. A tourist walking alone at night is approached by a guard who warns him that he is in a very dangerous place. A brain that has a "normal" fear in the face of real danger, a "normal" desire to preserve its life and a "normal" reason - inference capacity - takes the guard's advice and decides to return to the hotel where he is staying; one could say that this brain has control over its conscious intentions/choices/decisions. Now suppose the tourist's brain completely ignores the guard's advice, decides to move on and, as a result, is murdered; besides let us suppose that the autopsy reveals that the tourist's brain had a tumor, which affected his capacity to feel fear, or its capacity to control his desires, or his capacity to predict the consequences of his actions. That being the case, it does not seem that the tourist's conscious brain has conscious control over its conscious intentions/choices/decisions, that is, that it meets the necessary conditions for free will.

I will conclude these brief thoughts on the necessary conditions for free will addressing the relationship among the brain`s conscious intentions/choices/decisions, its conscious emotional/volitional/cognitive capacities and its physical and sociocultural environment, from which it gets most of its conscious contents. I am not going to say much about the influence of physical environment on free will, just that environmental "normal" conditions are also necessary for free will. It is known that "abnormal" conditions related to extreme environmental changes - starvation and violence related to very high or low temperatures, for example - affect more or less deeply the conscious emotional/volitional/cognitive capacities of the brain, accordingly its control over its conscious intentions/choices/decisions.

What about the relationship between the sociocultural environment and free will? What would be the *necessary* and *damaging conditions* for free will? Let us consider the following two situations. Situation 1. Subject *A*, race *X*, grew up in a sociocultural environment in which he received a strict education - family, religion and state - according to which individuals of race *Y* are essentially inferior, degenerate and dangerous; individuals *Y* should serve subjects *X*. Thus, subject *A* was encouraged from early childhood to love his brothers, race *X*, and to hate the others, race *Y*. One day, subject *A*, race *X*, and some friends, beat up an individual *B*, race *Y*, to death, on the grounds that *B* had stolen *A*`s house. Even though *A* was not sure that *B* actually committed the crime, A justified his action by saying that if it was not *B*, it was some other individual *Y*, and that *B*'s death would be an example for all individuals *Y*.

Situation 2. Subject *A*, race *X*, grew up in a sociocultural environment in which he received a liberal education - family, religion and state - according to which *A* was encouraged to weights the arguments for and against the existence of races, and on the justifications for and against the intellectual, moral and emotional superiority of one race over other. Subject *A* was always encouraged to think critically about ethical, religious and scientific knowledge offered to him. One day, subject *A*, race *X*, and some friends, beat up individual *B*, race *Y*, to death, for suspecting that *B* robbed his house; *A* justified his action, claiming that he had seen *B* nearby shortly before the robbery.

Comparing these two situations from what I said earlier about the relationship between brain and conscious mind allows me to illustrate what I believe to be a necessary condition for free will related to the sociocultural environment. I think that A`s brain, in situation 1, has *less control* over his conscious intention/choice/decision than in situation 2. In situation 1, A`s brain was raised in an environment in which a unique and non-critical view justifies and encourages his prejudiced feelings, wishes and actions; it is an environment which makes it difficult to the A`s brain critically assess its intentions/choices/decision related to race - *damaging condition*. In contrast, in situation 2, A`s brain was raised in an environment in which he was encouraged to reflect critically, based on favorable and contrary arguments, on his own intentions/choices/decisions related to race. What I am suggesting, from a very simplified description of the two situations, is that a sociocultural environment that encourages the exercise of critical thinking based on knowledge and reflection on different views of world is - besides a "normal" conscious cognition, volition and emotion - a necessary condition for brain`s control over its conscious intentions/choices/decisions, that is, for free will.

Concluding Remarks

From a schematic presentation of Libet-style experiments, I started this paper by wondering whether the assumption that brain events precede conscious intentions/choices/decisions, which, in turn, precede other brain events prior to voluntary actions, implies that free will is an illusion. I have said that the answer to this question depends on how one answers three other fundamental questions involving the relationship between the conscious mind and the brain. The first one is whether brain events cause conscious events; the second one is whether conscious events cause brain events; the third one is whether the agent of voluntary action is the conscious mind, the brain, or both. Briefly, my answers, in the second section of this paper, were as follows.

I have answered "yes" to the first question, arguing that the prediction of conscious intentions/choices/decisions, based on the identification of the particular brain events that precede them, is compatible with, and strongly suggests that brain events cause conscious events. The answer to the second question was also "yes", however highlighting that conscious events are not a Cartesian substance, but properties of the brain due to which the brain has causal capacities that it otherwise would not have; being brain`s guides of action, the conscious events are not epiphenomenal properties. The answer to the third question is implied by the answers to the previous questions, that is, by defending that the conscious mind is a property of the brain, due to which the brain has

the causal capacity to interact with the body and, through it, with the external environment, I was suggesting that *the brain is the agent*, that is, it is the brain that consciously intends/chooses/decides, and does it based on the conscious contents of its knowledges, wills and emotions.[9]

Back to the initial question, I agree with the interpretations of Libet-style experiments according to which free will is an illusion. However, I believe that this criticism applies only to the view that the *conscious mind* is the agent; Libet-style experiments do not show that free will is an illusion if the *conscious brain* is the agent. Would free will be an illusion if the *brain is the agent* and the *conscious mind its guide of action*? Assuming that the brain, embodied and socio-culturally situated, is the agent that uses its conscious mind, in its various forms - cognitive, volitional, emotional - and contents, as guides of its voluntary action, I briefly presented, in the second section, what I consider to be the necessary conditions for the brain to have control over its conscious intentions/choices/decisions, that is, for the brain to have free will. Although the description of exemplary situations had been oversimplified, I believe that for the moment it is enough to illustrate what would be a free will approach focused on its *necessary conditions* assuming that the brain is the agent and the conscious mind is its guide of action.

The question that arises from there is whether these *necessary conditions* for the brain to have control over its conscious intentions/choices/decisions would also be *sufficient conditions* for free will. This is a more difficult question than the previous one, the *hard problem of free will*, derived from the fact that the agent brain certainly does not have control over an important part of its past physical and sociocultural history, which is crucially associated to what it currently is. From the physical point of view, it should be considered that the agent brain has a history which involve a genetic program and biological processes inherent to its development in the mother`s body and early childhood, this one related to the effects of chemical substances constituting consumption habits and the environment of the mother - food, drugs, pollution etc. The history of the agent brain also includes its sociocultural environment with which it consciously interacted, even before birth, being significant the quality of social relations and the ethical, religious, scientific education of the people close to it. Being the *agent brain* inseparable from its past history, which he did not control, could it have control over his present and future intentions/choices/decision? Answering this question, to examine more deeply the necessary conditions for free will, and reflect on the relationship between free will and moral responsibility will be the next step of my work on free will from the assumption that the brain is the agent and the conscious mind is its guide of action.

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[9] I am arguing that the agent is not a kind of Cartesian person, that is, a conscious substance separable and independent of the brain, with which mysteriously would interact. I assume that a person, constituted by conscious sensations, memories, imaginations, beliefs, desires, emotions etc. is inseparable from, dependent and instantiated on the brain; it means that it is as a conscious and self-conscious person that the brain interacts with the body and, through it, with the external physical and sociocultural environment.