Freedom and ethics: Benjamin Libet's work

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Abstract

A fundamental idea to sustain basic ethical concepts such as autonomy, responsibility, etc., is "liberty". The determinism/freedom aporia has been present in philosophical tradition since ancient world. However, after the development of neuroscience, it has been argued that freedom is merely an illusion and human beings are neurobiologically determined in our actions. This paper presents the pioneering work of Benjamin Libet on this subject (an approach that used electroencephalography and electromyography), also a critique on Libet interpretations of his results.
Keywords: Bioethics. Neurosciences. Philosophy.

Resumen

Libertad y ética: el trabajo de Benjamin Libet

Una idea fundamental para sostener conceptos éticos fundamentales, tales como el de autonomía, responsabilidad etc., lo es la "libertad". La aporía determinismo/libertad ha estado presente en la filosofía desde el mundo antiguo. Sin embargo, tras el desarrollo de las neurociencias, se ha planteado que la libertad es una mera ilusión y que los seres humanos estamos determinados neurobiológicamente en nuestro actuar. Este trabajo presenta los trabajos pioneros de Benjamín Libet sobre este tema (una aproximación que utilizó electroencefalografía y electromiografía), a la vez que realiza una crítica sobre las interpretaciones del propio Libet.
Palabras-clave: Bioética. Neurociencias. Filosofía.

Resumo

Liberdade e ética: o trabalho de Benjamin Libet

Uma ideia fundamental para sustentar conceitos éticos fundamentais, tais como autonomia, responsabilidade, etc., é a "liberdade". A aporia determinismo/liberdade tem sido presente na filosofia desde o mundo antigo. No entanto, após o desenvolvimento da neurociência, tem-se argumentado que a liberdade é uma mera ilusão e que nós seres humanos estamos neurobiologicamente determinados em nossas ações. Este artigo apresenta os estudos pioneiros de Benjamin Libet sobre este assunto (una abordagem que utilizou eletroencefalografia e eletroneuromiografia), enquanto realiza uma crítica sobre as interpretações do próprio Libet.
Palavras-chave: Bioética. Neurociências. Filosofia.

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Neurophilosophy

The term "neurophilosophy" was introduced by Patricia Smith-Churchland, Canadian philosopher, in a text that is now obligatory reference to address the issue [1]. In it, Churchland proposes a systematic view of the neurophilosophy, the first appearing in the history of philosophy and in the history of neuroscience. This view would be, very synthetically, to support the radical biologistic materialism: any mental state can be reduced to a brain state and thus it is possible to fully explain it. Thus, the *paleophilosophy* should be abandoned to make way for the *neophilosophy, a neurophilosophy* that actually ends up being diluted when the neurosciences can fully explain the issues that traditionally philosophy have addressed from the ancient world (memory, learning, consciousness, free will etc.).

Although Churchland had (and still has) faithful adherents to his position, he has also had serious detractors. One of them was Gunther S. Stent, renowned molecular biologist, who after the appearance of the text of Churchland published a review which considers that the monistic position adopted does not explain everything that it seems to want to explain [2]. Subsequently, Stent published another work where he exposes that exist unique characteristics of human life that can not be reduced to a neurobiological explanation, such as the moral life [3].

The radical stance of Churchland is not alone in the field of neurophilosophy. There are other views of what should be the neurophilosophy that if it was a discipline (subject that is beyond the scope of analysis in this text), it should be raised that is under construction. These other visions would not be radical, since they would not reduce all own and fully human life to the activity of the neuronal circuits, but they would agree that neuroscientific advances must be taken into account when developing a philosophy.

Probably the most developed stance in this regard is the one of Georg Northoff, who has interesting works where he tries to define what neurophilosophy would be[4] and what could be its methodology [5]. In fact, it is appreciated for the ideas in this paper, as many who believe the neuroscientific knowledge must be taken into account when drafting philosophy, just do not say how. Northoff elaborates a theory that emerges from the recognition that the inclusion of subjective experience or first person perspective [6] in developing a neurophilosophy.

It seems that the moderate positions would be more plausible, rich and successful in their theoretical and methodological contributions. So, if you are going to talk about a neurophilosophy, we should speak of the branches of classical philosophy with the prefix "*neuro*", with the aim of highlighting this new approach, so you can speak of a neuroepistemology [7], a neuroethics [8] etc. It has been written a lot about the latter; in fact, perhaps the greatest attention was in the neurophilosophy branch so far (even, probably more than in neurophilosophy itself). Possibly this is due to it has been stressed that with the neuroscientist advance we should perhaps rethink issues of far-reaching and extensive philosophical tradition, such as consciousness, freedom, and responsibility [9].

These themes are necessary and unavoidable if you want to treat seriously the issue of ethics: we must speak of a moral conscience, the possibility of freedom and responsibility to address the issue of ethics. Thus, in this paper the work of a neuroscientist on the theme of freedom and some possible implications that could have effects on ethics is discussed.

Benjamin Libet

Benjamin Libet was born on April 12, 1916 in Chicago, the first child of a couple of Jewish immigrants from Ukraine [10]. His father and grandfather were tailors and didn't speak English, so that Benjamin had to learn it in the streets of the West of Chicago, populated primarily of Jewish and Italian immigrants.

In 1936 obtained his degree at the University of Chicago and in 1939 his PhD in physiology (with Ralph W. Gerard). He did postdoctoral work between 1939 and 1945: at Albany Medical College (1939), the Institute of Pennsylvania Hospital (1940), the University of Pennsylvania School of Medicine (1943), his alma mater, where he meet again with his mentor (1945) [11] .

He came to the University of California, San Francisco in 1949, where he was Professor Emeritus from 1984. In 2003 received in its first edition, the "Virtual Nobel Prize in Psychology", awarded by the University of Klagenfurt (Austria), *for his pioneer achievements in the research of consciousness, initiation of the action, and free will* [12].

After the influence of Sir John Eccles [13], Libet investigated the synaptic and postsynaptic responses, drifting his interest gradually towards the

electrogenic mechanisms [14-16], field that did not abandon. In the 1970's he became involved in the research of the neuronal threshold activity and feelings. His initial researches involved the determination of the amount of activation at specific sites in the brain required to trigger the artificial somatic sensations, based on routine psychophysical procedures. This work soon crossed into research on human consciousness, and its famous experiments on the neurobiology and freedom.

The Libet experiment

We must remember that Hans Berger begins the studies in electroencephalography in humans in the 1920s. The improvement of technique and the standardization made progress in this field. In 1965 Hans Helmut Kornhuber and Lüder Deecke discovered what they called in German as "Bereitschaftspotential" [17], In English is translated as "readiness potential", while in Spanish it is translated as "potencial de preparación" or "potencial de disposición". Moreover, in the 1960s also the clinical use of electromyography was generalized.

With this background, the Libet team had technical conditions to start the interesting experiment that has been aforementioned (for and against) regarding the relationship between freedom and neuroscience. A research subject was placed in front of a clock that had a watch hand and gave a complete turn in 2.56 seconds (about 25 times faster than normal). The subject, always attentive to watch, would flex a wrist when he wished, and would indicate the position of the watch hand of the time in which he was aware that he wanted to flex his wrist; this subjective report was termed as W (will).

At a later time, the research subject would report the instant at which he had made the movement; to this subjective report was referred to as "M" (motion). The times of W and M informed to Libet's team the subjective moment in which the research subject expressed the desire of movement and the time of its execution. Besides the two subjective parameters, Libet's team drew on technological background available, so that they also made a pair of objective records: the readiness potential in brain motor areas, and the electromyography of the muscles involved in the wrist flexion [18-21].

The findings were (and still are) very interesting. In subjective terms, the research subjects indicated a W firstly and then a M, i.e. conscious perception of the desire to perform a movement (the wrist flexion) preceded the attainment of such movement. This could easily be interpreted as a correspondence between brain events and the subjective experience of the research subjects. However, what attracted wide attention of Libet's team (which remains striking, regardless of the position to be taken on the issue of freedom) were the results of the objective tests. They found that the readiness potential appeared between 300 and 500 ms before the subject had the conscious perception of the desire to flex the wrist, W. Data were collected and reinterpreted by Libet himself, who said:

The freely voluntary acts are preceded by a specific electrical change in the brain (the 'readiness potential', RP) starting 550 ms before the event. The human subjects come to realize that the intention of acting 350-400 ms after the beginning of the RP, but 200 ms before the motor act. Accordingly, the volitional process starts unconsciously. But the conscious function could still control the outcome, as it can veto the act. The free will, therefore, is not excluded. These findings put restrictions on the views of how the free will can operate; it would not initiate a voluntary act, but could monitor the performance of the act. The results also affect the views about guilt and responsibility [22].

In essence, this is what the work of the Libet's team was about and the fuller interpretation given by Libet himself to the results. This empirical approach to the problem of human freedom has received several criticisms, even in contradictory senses.

Criticisms from philosophy

Actually the problem of the determinism/freedom aporia is as old as philosophy itself. It is not therefore novelty that there are philosophers using neuroscientific data in favor of a biologistic materialistic determinism, neurobiological in the case analyzed in this paper. Heraclitus and the Stoics spoke of the determinism, this subject was also present at the Council of Trent, and in the secular world it has been present in different scientifistic visions. The philosophical reflection asks questions, while science tries to give answers; then is this integration possible?

For a radical vision as the neurophilosophy raised by Churchland, who believes that the brain is nothing but a causal machine, it has been understood that the problem has been resolved: freedom does not exist, and consciousness is not even a

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problem as a neuronal epiphenomenon [23]. Actually human beings are determined and freedom is merely an illusion created by the brain activity itself. Obviously, this approach is not the unique one. For example, Antonio Damasio, famous neuroscientist that has publications where he dialogues with philosophy, believes that the brain is not only a "causal machine", because it is about a biological element that is in constant evolution (phylogenetic and ontogenetic), both from the genetic point of view and from epigenetic [24] . Moreover, Damasio believes that there is actually an unconscious programmed by consciousness; to introduce an element as the "unconscious" seems a return to Freudian psychoanalytic views, but there are intense debates on this subject. For example, Eric Kandel, a psychiatrist and neuroscientist, Nobel Prize in Physiology or Medicine in 2000, believes that the best theory of the mind with which we can study the brain is precisely given by Freudian psychoanalysis [25].

For other non-radical visions, it has been generated a number of terms to consider when developing a reflection on empirical observations of experiments like Libet's. Those visions would ask, as mentioned, more questions rather than trying to provide answers: Is Libet's experiment really addressing the issue of freedom? Many have answered a resounding "yes".

If so, is the model of Libet's experiment comparable when someone "believes" that has made the "free" decision to terminate a pregnancy?, is it comparable to the "free" request of an intervention of euthanasia? It seems, at least, that there are reasons to believe that they are not comparable situations.

Also, if it was accepted that the brain is the "causal machine", where Libet effectively demonstrates that freedom does not exist and that the human beings are determined, how is it possible to explain that there are different moral, legal and political systems with this same machine? If humans are driven by their neurons, those deemed responsible in the Reich Regime in Nazi Germany did not exterminate millions of Jews, but their neurons did?

Probably one of the problems with these issues, for or against Libet's proposals, is that it seems they are talking about the same, but this is not the case. In other words: Does Libet mean by "freedom" the same as in philosophy? Tremendous question. And it is because anyone erudite in philosophy might ask then: What author? Not all philosophers and different philosophical schools have understood the same way about "freedom" or "determinism". This has been noted in a exceptionally brilliant way in the joint work of a philosopher and a neuroscientist [26].

Libet himself tried to answer some of the criticisms made to his approaches, even said on one occasion that *It is interesting that most of the negative criticisms to our findings and their implications come from philosophers and others with a negligible experience in experimental brain neuroscience* [27]. In order to attempt to make justice to this point, now are incorporated some of the criticisms made by neuroscientists to Libet's work.

Criticisms from neuroscience

One of the criticisms that has been done was about the wide variability in the differences between different subjects regarding the judgment made about the time of occurrence of internal events [28] , two of the crucial measurements in the Libet's experiment. If the difference between one subject and another is very large, we should reconsider the validity of this type of measurement and the correlates that may flow from there (either each other or in connection with objective measurements carried out by Libet's team) . Furthermore, if the problem is the measurement of time and there are physicists who seriously postulate that this does not exist, then would it be worth it , from the purely physical point of view? It should be noted that in this paper is not discussed in depth the variable "time" in the Libet's experiments (what would be cause for further analysis).

Other researchers have found that if the conditions of the experiment are modified with a monitor that shows a stimulus (instead of the watch) to press a button (instead of the wrist flexion), it is possible to find the potential of preparation prior to stimulus, so that they suggest that it could mean waiting instead of preparing for action [29]. Still others have modified the experiment in another sense, using magnetoencephalography and distinguishing forced behaviors (use a finger to press a button) and free behaviors (choosing your finger), finding differences in the readiness potential in both groups of events, and in others cortical areas involved [30] .

Some researchers have addressed another variable which it is not discussed in this paper, as it is the awareness. The question would be, is it necessary that the decision to make movement is conscious to be considered free? [31]. Some others have proposed that the readiness potential is actually related to the movement, but not to the processes that prepare for

the decision making about the act [32]. It has also been proposed that the experiments should be repeated, but with unambiguous data [33]. However, literature often quotes Libet as the neuroscientist who showed experimentally that freedom does not exist.

Finally, we should make a special mention for the Daniel Dennett's criticism, philosopher and cognitive neuroscientist. Dennett is one of the contemporary representatives of the "compatibilism" (next to the existentialist philosopher Frithjof Bergmann). This approach attempts to conciliate the determinism with the possibility of free will. In the same way that the determinism is not created by Libet, the compatibilism is not a creation of Dennett's either. The old ways of compatibilism appear from secular positions in Stoic philosophy, and there are also interpretations of compatibilism in Christian theology. In the modern world we have the compatibilism of Tomas Hobbs and David Hume; in the nineteenth century it is refined in the works of John Stuart Mill, Henry Sidgwick and F.H. Bradley. In the twentieth century George Edward Moore and R.E. Hobart appear. The compatibilist tradition is followed by Dennett, who adds neuroscientists elements to try to reconcile the idea that a staunch determinism is not possible, taking in account that is not reasonable to consider the free will as absolute either [34-35].

Dennett believes that philosophy must be based on scientific data and be less speculative. So, he accepts that there are at least three approaches, attitudes or levels of description: the physical, the design and the intentional. On a physical level we must accept the materialism and determinism; on levels of design and intentional you can speak of freedom as you can find the preventability. Additionally, Dennett believes that concepts such as "necessity", "possibility" and "causality" are compatible with determinism. Probably some philosophers would disagree with this, for example Eduardo Nicol, who considered (like many others) that the human being is historical, so that three factors are always intertwined in their life: freedom, randomness and necessity, in what he called "the character, fate and chance" [36] . In addition, there are criticisms to Dennett's work; to give you an example: he assumes from the start, without much explanation, sustaining philosophical data with scientific data, thus reducing the philosophy to science, and the human being to physical materiality (which would contradict its view that despite the physical determinism, there is no room for freedom) [37] . Anyway, this is one of the contemporary thinkers who discussed the extreme determinism from Libet's data.

Epilogue: the brainhood (encefalicidad in Spanish)

The friendly reader who has reached this point just noticed that there is a neologism that, if you look in the dictionary of the Royal Spanish Academy, you would not find it. It is a translation into the Spanish language of a term recently coined in English, that of brainhood. This neologism was introduced by an historian of science who lives in Germany, Fernando Vidal, who says *If personality is the quality of being an individual, brainhood can name the quality or condition of being a brain* [8].

For this translation proposal there have been mainly considered two points: first, brain-dead is translated as brain-dead, from which one can see that brain admits the translation as a noun and as an adjective; second, in Spanish, the Latin suffix "*dad* " forms from adjectives, abstract nouns of quality, and may take the forms of "-idad"," -edad" or "-eidad ".

The brainhood therefore makes reference to a "brain subject" [39], corresponding to an inherent anthropological figure of modernity, even more, to the contemporaneity. If after the human genome project it seemed that the "essence" of the human being was in the genes [40] (which was not such), it appeared that interest in seeking what the human being is ultimately has derived now to the research on the brain. If the concept of person was explained in terms of genome, now it tends to be explained in terms of connectome [41]: if something will respond to concerns about the brain functioning that would be the circuits.

An example exposed by Vidal regarding the brainhood in the contemporary world is the neuroethics. It can clearly be seen that the human being has a quality that has proven to be elusive from many points of view: human beings are inevitably moral subjects. For Stent morality would be a stumbling block while reducing all the mental activity to the brain; for Vidal, Neuroethics would result in a paradigmatic way of seeing a human activity reduced to a neuronal activity... is it possible to think that all the moral acts of human beings are causally determined?

Finally, the question that perhaps should appear at the beginning of this paper, can such an experiment be designed showing that freedom exists or not? An answer to this question is provided by Adela Cortina with solid arguments, saying that *it will be impossible to prove that freedom does not exist from the neurosciences, precisely because the empirical method should stick to the facts that may*

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be experienced, but to say that everything is causally determined is a metaphysical statement, that an empirical method can not afford [42] .

If neuroscientific advances must be considered in the development of philosophy, it seems that it should take another course.

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