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NEUROSCIENCE AND THE FREE WILL PROBLEM
Bilkent University 2020

NEUROSCIENCE AND THE FREE WILL PROBLEM

A Master Thesis

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Ankara
January 2020

NEUROSCIENCE AND THE FREE WILL PROBLEM

The Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

by

Ömer Hamza Açıköz

In Partial Fulfillment of the Requirements for the Degree of
MASTER OF ARTS IN PHILOSOPHY

DEPARTMENT OF PHILOSOPHY
İHSAN DOĞRAMACI BILKENT UNIVERSITY
ANKARA

January 2020

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Philosophy.

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ABSTRACT

NEUROSCIENCE AND THE FREE WILL PROBLEM

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January 2020

The free will problem examines whether people can control their behaviours or not. This problem is highly debated in philosophy. It is a multidimensional phenomenon and it includes social, ethical and psychological aspects. In this thesis, the free will problem will be analyzed from the philosophical and scientific aspects and it will be accordingly claimed that Libet's experiment (1983) was not successful in terms of evaluating the problem. The scientific and philosophical causes of this failure will be analyzed and thus a simplistic, an introductory and an alternative concept of free will shall be proposed in the end.

Keywords: Awareness, Free Will, Libet, Readiness Potential

ÖZET

NÖROBİLİM VE ÖZGÜR İRADE PROBLEMİ

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Yüksek Lisans, Felsefe Bölümü
Tez Danışmanı: Dr. Öğr. Üyesi István Albert Aranyosi

Ocak 2020

Özgür irade problemi insanların eylemlerini kontrol edip edememesini irdeler. Bu problem felsefede sıkça tartışılan bir problemdir. Çok boyutlu bir fenomen olup sosyal, etik, psikolojik boyutları içinde barındırır. Bu tezde özgür irade problemi felsefi ve nörobilimsel yönlerden analiz edilecek ve böylece sonuçta Libet Deneyi'nin (1983) bu problemi başarılı bir şekilde ele alamadığı öne sürülecektir. Bu başarısızlığın bilimsel ve felsefi nedenleri analiz edilerek basit ve giriş niteliğinde olan alternatif bir özgür irade konsepti sunulacaktır.

Anahtar Kelimeler: Farkındalık, Hazır Olma Potansiyeli, Libet, Özgür İrade

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CHAPTER 1

INTRODUCTION

Inquiries into issues related to the notion of freedom of the will used to be considered the monopoly of philosophy. Yet, Benjamin Libet's pioneering experiments in the 1980s uncovered a new frontier in the theoretical exploration of this topic. Interpreting Libet's data from the experiment in, apparently, the most straightforward way, some scholars (Harris 2012; Wegner 2002) have come to argue that free will is an illusion. However, I shall accordingly argue that these scholars have missed the point that Libet's concept of free will and his operational definition of voluntary action cannot be utilized as an absolute finding which ends once and for all the philosophical debate about free will.

What Libet's experiment did was to enable philosophers and scientists to implement a possible definition of the concept of free will in an operational fashion. In other words, Libet's experiment had opened the path to shape the discussions of the concept of free will into a scientifically analyzable and falsifiable ground. By applying this ground, which is the same as in scientific endeavors, concepts are defined in relation to scientific conditions where the candidate concept is analyzed. The main advantage of such transition is that now philosophers can also regard neuroscience as a relevant field in the discussion of free will. Yet, in contrast to the arguments of the philosophical camp of "Free will is an illusion", Libet's experiment

had not proved itself an authority to end the debate, but it at least pioneered the way to add the neuroscientific dimension to the philosophical debate.

In my thesis I shall specifically claim that Libet's concept of free will and his operational definition of voluntary action will not suffice to be an ideal definition for the problem of free will. In this particular and purposive context, so as to structure my argument, by means of the following brief chapters, I shall first provide an introduction to Libet's experiment and then the state of the relevant experiments from the several aspects. Thus I shall accordingly pursue the following order, in general, wherein I shall "internally criticize" Libet's experiment by investigating its parameters in the former chapters, such as: Readiness potential (RP), the subjective report of subject's initial awareness of their intention and awareness of motor actions. In the latter chapter, I shall "externally criticize" Libet's experiment by raising question on Libet's concept of free will and the operational definition of voluntary action. After that by encapsulating Libet's free will from the both fronts (inside and outside), I shall provide a basic and introductory concept of free will that can be utilized both in philosophical and scientific dimensions.

CHAPTER 2

LIBET'S EXPERIMENT AND OTHER NEUROSCIENTIFIC EXPERIMENTS REGARDING FREE WILL

Now, let us expound Libet's experiment and his findings with regard to free will. Libet's experiment is mainly dependent on the phenomenon of Readiness Potential (RP) which demonstrates the neural activity preceding motor action. RP is recorded from the scalp of the agent, and the electric potential builds up before the voluntary motor action (Kornhuber & Deecke 1965) in such a way that it can be utilized for experimental purposes. The important aspect to consider is how Libet specified the concepts of voluntary action, an agent's will, and, of course, the experimental conditions. In this experimental investigation and its analysis:

> An act is regarded as voluntary and a function of the subject's will when (a) it arises endogenously, not in direct response to an external stimulus or cue; (b) there are no externally imposed restrictions or compulsions that directly or immediately control subjects' initiation and performance of the act; and (c) most important, subjects feel introspectively that they are performing the act on their own initiative and that they are free to start or not to start the act as they wish (Libet 1985: 529-530).

Regarding the experimental conditions, Libet specified for his subjects that if they felt the urge to do wrist of their fingers, the occurrences of urges must be totally spontaneous and endogenous (1985: 530-531). It can be seen that Libet aims to minimize external factors in the experimental conditions, since he had defined the

voluntary action (which had been provided as "a function of the subject's will") as arises endogenously, and should not be subjected to external restrictions. The feedbacks given by the subjects were straightforward, which is, they reported that they were aware of their urges before they executed their actions (1985: 531). And also, for some instances subjects reported that they were able to suppress their urges and in result not having executed the actions (1985: 538).

Libet's experimental findings had depicted an unintuitive picture in the relation of urge, awareness, and the execution of action. According to the data, the onset time for RP preceded the subject's report of their "initial awareness of intending or wanting to move" by 350 ms, and the onset time for RP preceded the execution of the motor action by 550 ms. These findings made Libet assert that the initiation of voluntary action itself is unconsciously triggered by the preceding neural processes (1985: 536). The common intuitive explanation was that the urge, or wish of the agent is itself the trigger for herself to execute the desired action. This would be based on the fact that the concept of initiation entails that the initiator (e.g. wish) has the quality of temporal precedence (in regard of occurrence) relative to the initiated (e.g. the action).

The experimental finding that subjects can suppress their urges (and the above experimental finding) had made Libet to conclude that: "the conscious veto may not require or be the direct result of preceding unconscious processes" (1999: 53). Since, the conscious veto may not be subjected to the preceding unconscious processes, it became reasonable to Libet to assert that conscious intention does not possess triggering qualities, rather it only can have a function of control. In other words, conscious intention is a reflection of whether the action will be executed, not about when it will be executed (in terms of its initiation).

As we have introduced Libet's experiment, let us now present some other experimental work undertaken by various researchers in recent years. Saigle, Dubljević, & Racine (2018) studied neuroscientific studies those used Libet's method. They have presented Libet's paradigm which is the substantial five features define Libet's work: **i)** visual stimulus is provided for the measurement purposes for action and intention, **ii)** by utilizing this visual stimulus participants reported their intention and action time (e.g. by using the spot on the given analogue clock) **iii)** the imitation of not pre-mediated spontaneous and voluntary movement, **iv)** measurement of two events: the time onset of awareness of the urge, and the time onset for awareness of initiating the action, and **v)** the condition of at least 40 trials were made (2018: 31). For being eligible to be considered as a relevant work to Libet's work at least three of these conditions must be satisfied. Saigle reported that there are 48 works that satisfied at least three conditions.

Further, these 48 articles were grouped into five in regard of their characteristics in terms of their methodology: **i)** this group applied similar methodology to Libet, Gleason, Wright, & Pearl's (1983) experiment; these following four groups of experiments implemented in different characteristics, and are differentiated from Libet's paradigm: **ii)** Instead of utilizing a clock, in this group stream of letters provided in order to participants can report their timing of decision, **iii)** upon the completion of action an auditory stimulus initiated **iv)** active/passive movements were judged by participants, and **v)** request of the participants to alter their decisions (to act) when they had the urge to do the given action (Saigle et al. 2018: 31).

The most important remarks from the study are: As you can observe there are significant differences between methods those have been used in these studies. One of the most important parameters in Libet's experiment, the time onset of W (initial

awareness of intending or wanting to move) is measured only by 27 of 48 experiments (2018: 31), and the time onset of M (awareness of actually moving) (Libet et al. 1983) is measured only by 28 of them (Saigle et al. 2018: 33). The striking aspect is only 11 of these experiments had measured both of the time onset of W and M (2018: 33).

In addition to subjective (which were reported by participants) parameters (the time onset of W and M), also the objective parameter (the parameters which their measurement do not depend on phenomenological qualities) of Readiness Potential (RP) is not measured in most of the so called Libet-like experiments. Only 12 studies measured RP (2018: 33), and only 6 of them compared RP or LRP to W (2018: 34). As it can be seen that, since most of the studies had not measured and compared the most important parameters in Libet's experiment, it can be stated that most of the studies which they introduced them as following Libet's experimental design do not possess sufficient qualities to back up their hypotheses.

Therefore, in our conceptual analysis for free will, we shall take Libet's paradigm as the central one, and build upon the analysis on the investigations of the above-mentioned parameters. In the next chapter, we shall observe whether RP can provide a feasible ground for "experimentations of free will". This investigation will accordingly make the basis for the first internal criticism of Libet's experiment (i.e. By uttering "internal criticism" I have meant that I shall base my particular criticisms from the occurrences of faults within the system, such faults can be sourced from parameters, etc. Therefore, until proceeding to "external criticism" I shall not question whether Libet's concept of free will and his operational definition of voluntary action is correct or not, it is not in the scope of "internal criticism").

CHAPTER 3

IS RP RELIABLE FOR "EXPERIMENTATIONS" OF FREE WILL?

Libet's experiment and his main conclusions from it [to remember them: i) Free will should not be considered for being a trigger-like function, rather it is a control function for the actions, and ii) the conscious veto process is the central quality that made us to be in control our actions (1985: 536) (in other words, even if we do not have the control of unconscious cerebral processes for initiating volitional actions; we still have the ability to veto them, or to control them whether it will happen)] provoked some criticism by scholars in the field.

I believe that the main criticisms are sourced from the nature of the readiness potential. As one can remember the temporal precedence of RP before the W (report of the subjects of their awareness of the urge) was the main finding that Libet utilized his conclusions. Therefore, in order to investigate the legitimacy of Libet's experiment, RP should be investigated in terms of whether it is reliable in Libet-like experiments or not. Doing this task, we have to pose the following question: What really is RP, where did it come from, and how should it be interpreted?

So as to clarify our conceptual ground, Let us start the investigation by considering the history of RP beforehand. Readiness Potential (its original name in German:

"Bereitschaftspotential") was discovered by Kornhuber and Deecke (1965) and had opened up a whole new insight in the neurophysiological field. The pioneering aspect that achieved was by implementing the novel methods of "chronological data storage" and "reverse computation" they allowed to track the event related potentials. Their representation in temporal and spatial distributions had achieved (2016: 1121). In order to successfully attain to the measurement of RP i) muscles at the head and neck and eye movements should be controlled (e.g. by the mean of utilizing fixation point while undertaking a given task) ii) electrodes and cables during the measurement should be constant (2016: 1122), iii) tasks those were employed should be initialized in repeatable manner (as in the case of Libet's experiment where the experiment consisted of trials) and these tasks should be recognizable by the computer system (2016: 1121).

For example Libet had satisfied these requirements in the experiment, it can be said that RP can be seen as a legitimate indicator. For him, since it precedes the time onset of the participant's report for their awareness of urge, it may entail that it is indeed the case that RP is the marker of the brain activity that takes place before the conscious volition. However, the status of mere temporal precedence cannot fully bestow RP the proof for the claim that conscious volition is not the trigger for actions. We need to be careful to investigate these two phenomena thoroughly: i) readiness potential, and ii) participant's report for their awareness of urge and motor action (the aspect of awareness will be discussed in the next chapter). If one can demonstrate that one or both of these are not reliable, then we can assert that Libet's experiment is not constituted on solid foundations and as a result the experiment should not be considered as a decisive experiment in the discussion of free will.

Therefore, we need to look for experimental evaluations on RP in terms of its reliability.

3.1 What does RP Reflect?

If it is the case that RP is the cause (trigger) of conscious motor actions, then Libet's experiments will have a reliable impact on the traditional, intuitive understanding of free will, according to which it is the cause of actions. Yet, in this subchapter I shall offer some experimental findings that will undermine the reliability of RP in Libet's experiment.

3.1.1 RP can Reflect General Preparation for Motor Action

I think that Readiness Potential may not be solely specific to voluntary movement. The process of its building up before the given actions does not guarantee that they are only specific to those actions. Therefore, in order to support the claim above, Hermann, Pauen, Min, Busch, & Rieger's (2008) experiment can be provided as a good example. Hermann et al. advocated the view that RP should not be seen as a marker for specific voluntary movement. Instead it reflects the general preparation (2008: 156). Their experiment consisted of a "choice-reaction paradigm" where participants, by being cued by the visual stimulus, were instructed to use the instructed hand to press the button. The reason for choosing this paradigm was to eliminate the difficulties for evaluating participants' subjective report of the time of their urge of act (W).

We know that the result of the experiment was that neural activity (similar to Libet's finding) emerged before the motor response. However, there is an important difference: this neural activity existed even before the instruction of the stimulus, and these neural activities did not differ between the utilizations of left and right hands.

Thus, it can be claimed that this neural activity should not be seen as a specific preparation for one hand, rather it is a general preparation (2008: 156). Most importantly, it can be seen that since RP already occurred before the cue, it entails that RP cannot amount to having the function of determining which hand to choose; instead it is a general preparation.

On the other side, Trevena & Miller (2010) also provided a similar result from their experiment. Again, which hand to use is specified before, but in this experiment the decision time for the participants was predetermined by an auditory stimulus which is temporally unpredictable. Upon hearing the tone, the participant will have two alternatives: quickly tapping the button or not pressing it at all. The main motivation for introducing pre-determined decision time was for being able to compare the negative potentials preceding the cases between the movement and non-movement conditions (2010: 448). Two different trials were initiated: first, "always-move" trials in which participants always tapped the button upon hearing the tone, and second, "sometimes-move" trials in which participants had been asked to approximately in the half of the trials to tap and not to tap in the other half (not consecutively, just accomplishing it in number has been needed) (2010: 449).

The result was there was not any significant difference between the EEG negativity in the trials were participants tapped button and in the non-move trials, and also the result demonstrated that negativity was not greater when a movement is initialized then is not initialized (2010: 451). Therefore, these findings support the view that RP is not specific preparation for whether executing action or not (i.e. it is not specifically movement-related); instead it is a general preparation.

3.1.2 Timing of RP does not Covary with W

In this context, let us respond to the following question: Is the temporal precedence of RP sufficient for taking it as a cause of the actions that subjects executed? It should not be the case if only precedence is observed, due to the fact that causation needs more than precedence. Schlegel et al. (2013) initiated the replication of Haggard & Eimer (1999)'s results where they have suggested that RP does not covary with the time onset of W, but LRP (Lateral Readiness Potential) does. Yet, in the process of replication Schlegel could not replicate their results and therefore asserted that both RP and LRP do not covary with the time onset of W. (Schlegel et al. 2013: 329).

In the experiment participants have been told to decide spontaneously, and in the half of the trials they were free to choose which hand to use for pressing the button, and in the other half (again in numbers, not in the consecutive ordering) they were told to which hand to use. And also, half of the participants reported their W judgements (about when they first became aware of their urge to press the key, and the other half of them reported their M judgements (about when they pressed the key); and then these two group of participants shuffled in terms of what to report (2013: 330).

As for the result, it has been found that for the early and late W awareness, there was not any significant difference for the amplitudes of RPs. This demonstrated that RP does not covary with W (2013: 330), if it was the case then there should be significant differences between amplitudes. Also similar to RP, LRP did not have any covariant with W (2013: 331), in contrast to Haggard & Eimer (1999). Therefore replication was failed in terms of LRP (Schlegel et al. 2013: 332). All in all, both of

them could not correlate and, in result, RP cannot cause the conscious volition for the action. (2013: 333).

3.1.3 RP can also be Found in Nonconscious Actions

Another challenge for the legitimacy of RP may be that it also temporally precedes in the case of nonconscious actions. If it is the case, then it will undermine its reliability for Libet's experiment. Because, a negative potential which exists for both conscious and nonconscious actions cannot be utilized as a marker for the conscious volition, so as to achieve that it would be needed to be specific only for conscious actions. In this context, Keller & Heckhausen (1990)'s experiments provide us its demonstration. They conducted three different experiments. In the first experiment, it has been investigated that whether there were RP in the state of performing unconscious movements. The second is the replication of Libet's experiment, and the third is the control experiment (1990: 352). In the first experiment, participants told to "count backwards from 3521 in steps of 3." This counting process made in silence in order to eliminate speech artifacts (1990: 353). Unconscious moving, during the counting task, is occurred in all participants, likewise in the form of flexing fingers. Also participants reported that they have made pre-planned actions while they were counting. By knowing (it achieved by when the movement is detected by readings participants, they were asked whether the movement was pre-planned or spontaneous) the time onset of these reports, it has been investigated for RP in these time onsets (1990: 353).

It had been found that for both conscious motor acts, and non-conscious motor acts there were amplitudes of RP (1990: 356) and the time onset of RPs were close

between these two cases (1990: 358). Thus occurrence of RP is not unique only to conscious motor acts, it emerges in non-conscious motor acts also.

3.1.4. RP can Occur in "Non-motoric Processes"

Similarly, Alexander et al. (2016) present us the demonstration that RP can occur in the non-motor-related processes. They utilized a modified version of Libet's experiment (2016: 39). In this experiment, participants given the task to choose one of the letters (of four) from the screen and they have been asked to report their time for the decision for choosing the letter (after each trial). Immediately after the decision participants have two alternatives: pushing the button as soon as possible, or not making any overt response. Participants were instructed to choose these alternatives in such a way that both of them equally realized in number (2016: 40).

In conclusion, for both of the conditions of "decision only" and "decision plus movement" there were RPs and there were not significant differences between them (2016: 43). Therefore it has been demonstrated that RP is not unique for the motor actions (2016: 44).

3.2. Result and Further Discussion

As we can see from these experiments RP is not unique for only the tasks initiated in Libet's experiment. This negative potential can occur even in the absence of movements, and it can also be found in non-conscious actions. Its time onset does not covary with W-time and it can be seen more as a general anticipatory process. Its reliability is undermined by these findings, for a person who based their denial of free will on Libet's experiment would not be able to defend their claims. Since RP is shown as not exclusive to voluntary acts, it can be asserted that RP cannot be seen as a sign of neural correlates causes the trigger for actions.

As a side note, we may remark that Libet have not proposed that there must be a strict causal relationship between RP and voluntary actions (1985: 561). According to him: "showing that relevant cerebral processes start before W, RP processes need not themselves be in the direct cerebral path leading to the voluntary act." (1985: 562). This assertion demonstrates that Libet advocates the idea that neural causal relationship is not necessary for the temporal precedence of RP. However, even though such idea can be permissible, in the end it does not provide a coherent reasoning for further assuming that these RP processes are the initiators for the volitional acts. Therefore, in my opinion, Libet is mistaken in this regard, and he must be obliged to provide the necessary empirical data for demonstrating the causal relationship, as you have seen in the previous chapters he have not manage to provide that.

On the other hand, if RP does not constitute a solid parameter for spontaneous acts, what about pre-decided acts? Free will should not be considered as being observable in the domain of spontaneous acts. What are we doing when we deciding to make an action? Are all our decisions made in the medium of spontaneity? The methodology that Libet used was structured to isolate possible external factors those may alter the process of free will-ing, and to achieve that he relied on the phenomenon of urge, desire etc. So as to achieve the utilization of urge the medium should be spontaneous, in other words the participants "should" wait for the urge/desire come to them.

On this ground, The new problem can be specified as: if an action is made spontaneously, it would not guarantee to know that whether it is a conscious or an unconscious one. As Keller & Heckhausen's (1990) experiment provides, it is observed that both conscious and nonconscious spontaneous tasks can have RP. Yet again, spontaneous decisions do not correspond for being witnessed of an operation

of free will. It can be suggested that preceding of RP, in two perspectives, is not sufficient to claim that conscious volition is not freely made:

First, preceding cannot be entailed into causation/triggering, as we have seen in the experiment of Schlegel et al. (2013). Second, these RP measurements did not successfully capture the utilization of free will in other aspects: deciding, non-spontaneous mediums, planning, making judgements. Also to what can be associated to RP? Is it urge, or wish, or intention, or decision? Mele (as cited in Pockett, Banks & Gallagher 2006: 192) clarifies how RP onset can be associated, in his words:

> Libet describes the relevant occurrence of which the agent later becomes aware not only as a "decision" and the onset of an "intention" to move, but also as the onset of an "urge," a "wanting," and a "wish" to move. This leaves it open that at -550 ms, rather than acquire an intention or make a decision of which he is not conscious, the person instead acquires an urge or a desire of which he is not conscious and perhaps an urge or a desire that is stronger than any competing urge or desire at the time a preponderant urge or desire.

Libet repudiates this type of graded intention, and proposes that subjects report their awareness as soon as they aware of their intention, and there was no need for such reluctance to not be able to report a weaker urge rather than s stronger one (1985: 559). Yet, in the next subchapter there is a neuroscientific finding that may prove Libet mistaken in this regard.

3.3 A New Possible Approach for Understanding Spontaneous-Decision Tasks by RP

Let us set aside the discussion of whether spontaneous tasks are the proper tasks for the "experimentations" of free will and the investigation what and how awareness of urge may play a role in these experimentations to the next chapter. Instead let me introduce a novel perspective proposed by Schurger, Sitt, & Dehaene (2012) which

asserts that actions in spontaneous tasks are not caused by RP as in its traditional (or Libetean) understanding, which is RP plays the role of cause for the specific volition. Instead when neural activity crossed a certain threshold, it can be claimed that movement in the spontaneous tasks are "largely determined" by this neural activity (2012: 2904). The result was produced by the observation of the alignment of the shape and profile of RP with the data of the stochastic-decision model. The most important remark by Schurger et al. (2012) is that: "according to our model, uncued movements in a task like Libet's tend to be preceded by a gradual increase in neural activity whose causal role is incidental—not directed (consciously or otherwise) at producing a movement." (2012: 2909).

It can be observed that Schurger et al. (2012)'s remark can be seen very compatible to Mele's statement. It can probably be suggested that like in Libet's experimental condition, where the patients waited for the urge to flex their wrist, the small fluctuations of neural networks resulted in having the particular urge to flex the wrist. If it is the case, this supports Mele's alternative: person acquires the stronger urge, rather than just acquiring the urge. The acquisition of the urge in the non-instructed (e.g. by external cues) environments (i.e. freely made actions in the eyes of Libet) can be caused by the condition of which fluctuation is dominant to the other, and attains to the threshold.

Schurger et al. (2012)'s model, at first, can be seen as an indirect verification of Libetean free will in the expense of delegating the causal role of RP into the incidental role of neural fluctuations towards a threshold. It may argued that indeed attaining the threshold made the participants to undertake the action, and therefore still Libet's findings, even were weakened, holds. I disagree with this view specifically by stressing the fact that these tasks were spontaneous-decision tasks. In

other words, the incidental role of neural fluctuations towards a threshold in spontaneous-decision tasks cannot be generalized as a successful proof of an explanation of the illusion of free will, still the criticism I advocated remains - spontaneous decisions do not correspond for being witnessed of an operation of free will.

On these bases I shall now end this chapter, since the discussion must needed to be focused on the aspect of how spontaneous- decision tasks in the “experimentations” of free will not suffice to derive any successful generalization, and also more importantly the aspect of the awareness of urge and motor action. However, as the last remark it must be stressed that, as I provided different findings on RP, RP cannot be seen as having the causal role for conscious volition. The properties of RP that it can also occur in nonconscious actions and non-motoric processes undermine its credibility for being specific for voluntary movement.

CHAPTER 4

THE PROBLEM OF INTERNAL AWARENESS OF INTENTION AND MOTOR ACTIONS IN LIBET'S EXPERIMENT

After having identified weaknesses related to RP in Libet's experiment, we can now continue the second part of the internal criticism. Keeping in mind that Libet's conclusions were derived from these important parameters: RP, the time onset of the intention, and the time onset of the motor action. We will expound on how these time onsets are formed and demonstrate that the awareness of subjects (on these time onsets) can be defective, since this awareness can be manipulated. Similarly it can even be suggested that Libet's paradigm itself makes subjects vulnerable for being manipulated (Keller&Heckhausen 1990; Lau, Rogers, & Passingham 2006).

4.1 Intention and the Awareness of Intention

So as to take further step in our investigation, Let us start with this question: Is there a difference between an intention and awareness of it? Breitmeyer's (as cited in Gomes 1998: 589) observation is a good one when we are considering the question: "the actions investigated by Libet have been performed (by myself and several of my colleagues) without awareness of intent to act. By requiring subjects to attend to awareness of intent, Libet may have imposed intention artificially." We can also hear another observation mentioned by Gomes:

> I tried to put myself in the subjects' situation, ... , In order to be able to assign a different time to the intention, I tended to give myself a mental verbal order, such as ''Now'' or ''Go.'' Even without such mental verbal orders, I had in a certain sense to ''create'' a mental motor command, separating it artificially from the movement itself, in order to be able to assign a special timing to it. Other people I inquired had similar feelings. (1998: 589).

These two subjective observations, even though they seem to signify different aspects of the trials, demonstrate the nature of the difference between the intention and awareness of it.

Such observations may bring the consideration whether one can have intention to do some action without being aware of the intention itself. At first, proposing such a question may seem ridiculous in itself. Yet, still one can think about the possibility that the notion of "intention" may be a manifestation of a result-based process.

Now the question simply is: Is it really the case? In order to analyze it a little bit deeper, let me propose you four slightly different conditions in terms of action and awareness of intention about it: i) the action is done, but the agent is not aware of her intention, ii) the action is not done, and the agent is not aware of her intention, iii) the action is not done, but the agent is aware of her intention, and iv) the action is done, and the agent is aware of her intention. So as to transform them into more depictive, let me present these items: i) Susan picked up a particular book from her study room and went to the saloon, but when she was aware that she hold the book she could not recall why she got the book, ii) Even Susan had the intention of picking up the book, she was oblivious to her intention then, instead, she went for walking to refresh her mind, iii) Susan had the intention of picking up the book, but even she was aware of her intention she went for walking, and iv) Susan had the intention of picking up the book, and she picked up the book from her study room.

As far as I am concerned, the last two conditions were relatively intuitive: (iii) is the process of conscious vetoing; (iv) is executing the action with correspondent voluntary intention (It is also plausible to have a Libet-like criticism that intention cannot be a trigger function, rather it can be a control function. Yet, in this context I shall not delve into that due to the fact that the action of picking up the book is more complex from just executing movement of fingers). Also, (ii) can be seen as an event of forgetting.

Now, let us concentrate on (i). Susan had the book form her study room, but she was not aware that she had the intention to pick the book up. Let us think about that scenario; if it was the case for you, how would you behave? There are two possible behaviors: First, you would be totally oblivious to any circumstances that led to you having the book at your hand, it may drive you perplexed since there is no rational explanations behind it. Or second, you may think that since you have the book at your hand, you had the intention to pick it up. You may say it yourself, otherwise why would I pick the book without having any intention?

As it can be observed from the second possibility, humans can be inclined to explain their intention as a manifestation of a result-based process, in the manner of structuring their intention by utilizing the results (e.g. executed actions) as input (As in the case of "if the book is at my hand, I should have had the intention to pick it up."). I think, such possibilities signify the weakness of the concept of intention, in terms of its modifiability by using the resulting actions. Since, intention is considered as a preceding phenomenon from the action, its modifiability by using the succeeded phenomenon (i.e. action) undermines its credibility.

On the other hand, if awareness can be manipulated by events after actions, then this undermines awareness' credibility in its utilization in experiments. Therefore, in the following subchapters I shall now demonstrate how awareness of intention can be manipulated in neuroscientific means. By providing these means I shall demonstrate that awareness of intention is not isolated from possible manipulations, and therefore it is not a pure concept, independent from neural activities.

4.2 The Arousal of Artificial Intention by Libet's Paradigm

Imagine yourself being as a subject in Libet's experiment, sitting as the detectors were put on your head and hands, and you wonder what they would ask from you to do for the experiment. The instructor comes in and says: "Thank you for participating in the experiment. We will ask you to flex your finger whenever the urge comes endogenously to you. Just wait for the urge. After having the urge you can flex your wrist immediately or you can take your time, or even you can veto your urge to not flex your wrists. We want you report the moment when you had the urge came to you by looking the moving dot on the screen. Thank you." (I shall use, for this chapter, the terms of intention and urge interchangeably because of Libet. He uses them interchangeably as in the example: "… raises the question of whether conscious awareness of the voluntary urge or intention to act also appears with such similar advance timings." (Libet 1985: 624). Therefore the term "intention", in this chapter, should be only thought in conditions for the voluntary actions in Libet's experiment. In other words, in this context intention is equivocated with urge in such a way that it cannot be preplanned and not used for complex actions. You may criticize for such counterintuitive understanding of "intention", but I need to remind you that we are in the phase of internally criticizing Libet's experiment. Therefore, we need to follow the utilization of the terms as closely as possible to Libet's.)

You have started to do as told for the trials; you always wait for the intention to come. It is almost the same for the trials: waiting, becoming aware of it, doing or not doing, then proceeding to the next trial. There is an abrupt thing in this process, it is waiting for the urge to come. This forced focused attention may cause an indirect bias for subjects to perceive the feeling of that phenomenon. In other words, by waiting and having the urge over and over and over again, subjects' phenomenal sensitivity to acquire the urge can become more biased.

There is an experimental support to my above claim, provided by Keller & Heckhausen (1990). Keller & Heckhausen provided an alternate explanation that the instruction, for waiting the intention to come, made the subjects acquire a conscious awareness for automatic and unconscious motor acts (1990: 351). In other words, by being exposed to the given instruction, subjects' motor actions had been superficially brought to level of conscious awareness. Therefore, unconscious processes are brought into the field of conscious detection by this instruction.

The main finding supported this hypothesis was the observation of the difference between scalp distributions of RPs resulted from unconsciously made motor acts and RPs resulted from voluntary movements (1990: 359) (You may remember, from Chapter 2, that these RPs were acquired from these two experiments: mental counting task, and reproduction of Libet's experiment. The action of flexing from the mental counting task was unconscious for the subjects, and it was voluntary for subjects who followed Libet's experiment.). The explanation of the difference is there are different predominant neural generators for these RPs. As in the first task subjects have not asked to notice an intention to come, the movements (unconscious flexes) can be classified as "direct and unconscious response to sensory input from parietal regions of the brain." The supporting finding was that at the RP scalp

distributions there is a missing potential for the SMA area of brain, which area is considered to be the main area for the "preparation of voluntary self-initiated movements" (1990: 359).

For the second task, reproduction of Libet's paradigm, the activation of the supplementary motor area (SMA) can be seen as the indicator of the "selective attention" (which is induced by the command of waiting and looking for the intention to come) for perceiving the unconscious processes (1990: 359). If there weren't any induced command to subjects, there would not be an activity at SMA. Therefore subjects' intention for acting is induced by the command for waiting and looking for intention, and this intention therefore is artificially created.

4.3 Are Awareness of Intention and Awareness of Motor Acts Reliable?

Awareness of a phenomenon is an introspective feature. This feature can be seen as a possible weak chain-link for Libet's experiment, but Libet defends the legitimacy of subject's awareness. Libet's introduction of an objective visual clock position that it can be used for reporting the time onset of awareness objectively in time, made awareness to be a legitimate parameter (Libet et al. 1983: 637). It is reasonable to give justice to Libet for his argumentation, since a subject's report which is inherently introspective is modified into objectively analyzable data by providing her an objective tool to report on. Yet, as I mentioned in the earlier pages, awareness of intention can be considered as a result-based process. In other words, the process of the construction of awareness of intention may be the result of the subject's inference from elements that occur after the action is completed.

In this context, there are experiments (Lau, Rogers, & Passingham 2006, 2007; Banks & Isham 2009) which support and demonstrate my above considerations.

Mainly these experiments demonstrate that by manipulating the after-event conditions, subjects' time onset of awareness can be manipulated. Lau et al. reported that as the activity in the corresponded neural area is enhanced, the awareness of the phenomenon (e.g. the awareness of intention and the awareness of motor action) achieved earlier (2006: 7265). The experiment consists of four type of trials with different conditions: "action timing" condition, "auditory timing" condition, "action nontiming" condition and "auditory nontiming" condition. In action timing condition, paradigms in Libet's experiment were closely followed and subjects have been asked to report the moment when they have pressed the button. In action nontiming condition, subjects have not been asked to report the time onset of the action. Instead, after the action a red dot appeared after 200 ms, and they have been required to report the location of the dot (You can remember that, the dot is used for the identifying the onset time purposes, as in Libet's experiment.). In auditory timing condition, there were not any spontaneous voluntary action required. Instead, subjects were given a randomly timed auditory tone, which lasts for one second, and what have been required from the subjects was to report when the auditory tone started. Finally, in auditory nontiming condition, instead of reporting the time onset of the auditory tone, subjects reported the location of the dot (similar to the action nontiming condition) (2006: 7265-7266).

The main finding of the experiment was that there is a negative correlation between the amounts of activity in cingulate motor area (CMA) (corresponding neural area for the awareness of motor action, pressing the button) and the perceived time onset of motor action in the action timing condition. There is no such correlation in the action nontiming condition (2006: 7268). In other words, as activity in CMA increases, subjects' reports of the time onset of the action becomes earlier. As similar

to Keller&Heckhausen (1990)'s criticism, Lau et al. (2006) also criticizes Libet's experiment in terms of its demands before the task. Consequently this demand is the reason for the enhancement in activity at CMA, and subjects are exposed to this neural enhancement just before their action, since they were in an alert state for waiting the intention to come (2006: 7270).

On the other side, for the awareness of intention Lau, Rogers, Haggard, & Passingham (2004) reported that there is a similar relation, as between the CMA and the awareness of motor action, between the pre-SMA and the awareness of intention (2004: 1210). The shortcoming of the experiment was, in contrary to Lau et al. (2006), there was not any commitment for measuring the timing of the brain activity and the time onset of the intentions. (2004: 1208). However, they have established an experiment (Lau et al. 2007) to demonstrate that it is the case that enhancement in corresponding area manipulates the perception of the time onset for both (now adding the awareness of intention) by applying Transcranial Magnetic Stimulation (TMS). I shall not expound this experiment in this subchapter, since I am here considering the modifications independent to subjects. In contrast, applying TMS is initiated on subjects. Therefore, I shall leave that experiment to the next subchapter.

Banks & Isham (2009) provides the missing findings for Lau et al. (2004), and their experiment's conditions did not alter the state of subjects, just like Lau et al. (2006) did not. Their main finding is that subjects' report on the time onset of intention can be distorted by manipulating the apparent time of the action. (2009: 17). Manipulation of the apparent time of the action is achieved by the mean of utilizing a deceptive feedback after the action. The experiment consists of a similar paradigm to Libet's experiment, except it has two additional features. First, subjects' pressing (a button) hands were not visible. Second, upon pressing the button, subjects were

provided with an auditory beep, which lasts 200 ms. It is initiated after pressing the button and its time is randomly varied, the beep can be delivered after pressing the button between 5, 20, 40 and 60 ms. After the process of the deliverance of the auditory beep is ended, subjects were asked to report their time onset of the intention to press the button (2009: 18). The result was that subjects' report of the time onset of intention is shifted, proportional to the delay time of the auditory beep (5, 20, 40, or 60 ms) increased (2009: 19-20).

Moreover Banks & Isham (2009) also made a more depictive experiment: In this experiment, deceptive information about subjects' actions is provided by visual means not by auditory means. The processes were similar to the former experiment, but in some of the trials there was a 120 ms delayed video image of their hands projected, and in some of them there was no delay for the video image. They were asked to report their time onset of intention. The finding was that the average report of the time onset of the intention were 44 ms delayed, in accordance with video image delays (2009: 19). In other words, by seeing the delayed video of their actions subjects' awareness of intention became later. Therefore, even when there is not any manipulation in the exact time of the action, subjects' awareness of the intention can be manipulated by distorting the apparent time of the action. In more powerful words: "…we infer the moment of decision from the perceived moment of action." (2009: 20).

4.4 Awareness is not Entirely Independent from Neural Activities

As you can see from the previous subchapters, awareness is not entirely independent from neural activities (I shall not discuss whether it is totally dependent to neural activities, by taking the safe bet I only claim that it is not entirely independent.) In

order to demonstrate this fact in a more apparent way, in this subchapter I shall provide experiments where the neural areas were manipulated. My commitment to demonstrate those experiments may be seemed as an act of bringing irrelevant data to the internal criticism of Libet's experiment, since these manipulations were indeed made on the subjects. Yet, I need to remark that the aim of showing awareness is not independent from neural activities possesses an important feature to criticize Libet for demonstrating that depending on awareness is not a reliable parameter. At least, it can be said that by bringing these experiments, I will bite the bullet and say that those subjects would not satisfy as a suitable subjects in Libet's paradigm, I can accordingly demonstrate that awareness should not be blindly seen as an extraordinary feature that is pure and cannot be manipulated. Therefore it should not utilized as a base for our both experimental and conceptual analyses, or at least we need to have corrective measures when considering it in relevant contexts.

The report of the time onset of intention and the time onset of motor action can be manipulated by applying TMS (Lau et al. 2007); and by transcranial direct current stimulation (tDCS) the report of the time onset of intention can be made earlier (Douglas, Maniscalco, Hallett, Wassermann, & He 2015). Sirigu et al. (2004) demonstrated that patients with lesions in parietal region can indeed report the time onset of their action, but they cannot report when they became aware of their intention to act. Supporting Sirigu et al. (2004)'s findings, Desmurget et al. (2009) made an experiment by applying direct electrical stimulation (DEC) at the parietal regions of brain, and this stimulation caused subjects to have an awareness of intention to move.

Lau et al. applied TMS on their subjects after the execution of the action, where the experiment closely followed Libet's experiment, and importantly subjects did not

know for each trial whether they will be subjected to the stimulation (2007: 81). The experiment consists of two instructed conditions: “intention condition” and “movement condition”. In the intention condition, subjects were asked to report the time onset of their intention, and in the movement condition they were asked to report the time onset of the execution of the action, which is pressing the button (2007: 82). The important feature of these trials was in the half of the trials real TMS is applied over the pre-SMA, and in the remaining trials there is a sham (fake) TMS. Sham TMS is applied deceptively by creating auditory clicks, which are same to the real TMS case, which like real TMS pulses make the exact same clicks. TMS pulses whether they are real or sham applied exactly at the moment of the execution of action or after 200 ms from the time of execution the action (2007: 83).

The main finding was the average time onset of subjects’ reports of their awareness of intention to press the button was earlier by 139 ms (for non-delayed real TMS trials) and by 132 ms (for 200 ms delayed real TMS trials) from the sham TMS trials. Additionally, the average time onset of subjects’ reports of their awareness of their action of pressing the button was later by 64 ms (for non-delayed real TMS trials) and by 59 ms (for 200 ms delayed real TMS trials) from the sham TMS trials (2007: 83). Also by comparing non-delayed and 200 ms delayed TMS trials, it can be said that the delay of TMS did not make any significant difference between the timing of the reports of awareness. In overall, it can be seen that TMS caused the manipulation of subjects’ awareness of their intention to be earlier, and subjects’ awareness of their action to become later in time. Therefore, it can be said that since awareness has neural correlates it can be manipulated by applying stimulations to correspondent brain areas.

Douglas et al. (2015) reported that applying transcranial direct current stimulation (tDCS) on both contralateral left (Because, subjects were introduced to use their right hand to press the button) primary motor cortex (M1) and contralateral (left) angular gyrus (AG) resulted in the alteration of subjects' report of the time onset of intention (2015: 7250). This result was achieved by initiating an experiment which is closely similar to (in regard of behavioral tasks) Lau et al. (2007)'s, with a difference of adding control trials. Sound trials were performed as control trials where subjects, instead of reporting their awareness of the time onset of intention or awareness of the time onset of action, reported the time onset of the start of the given auditory tone (Douglas et al. 2015: 7240-7241). Moreover the main finding was the report of the time onset of intention shifted to earlier times in comparison to sham (fake) stimulation by 61 ms when AG is stimulated by tDCS, and 70 ms when M1 is stimulated.

Sirigu et al. (2004)'s experiment can be seen as a good demonstration of how the neural areas are important in terms of attaining awareness of intention. In this experiment, there are three types of subjects: normal healthy subjects, patients with lesions in their parietal cortex, and patients with lesions in their cerebellum (2004: 80). The experimental procedure was the same with Douglas et al. (2015)'s behavioral tasks (e.g. report of the time onset of awareness of intention and the report of the time onset of awareness of the execution of the action, and finally an auditory control task), except there was not any external stimulation.

Further the findings were that for all the groups, subjects were accurate in terms of their report of the time onset of the action. All of them reported the time onset close to the actual time of the action (2004: 81). The striking result had found in the reports of the time onset of intentions. Normal healthy subjects and patients with lesions in

the cerebellum were accurate in terms of these reports, but patients with lesions in the parietal cortex reported their first awareness of the intention to press the button as temporally very close to the exact time of the execution of action (2004: 81). Another finding is, for these patients the acquired data of RP were poor in amplitudes (2004: 82). These results demonstrated that the parietal area plays an important role for conscious monitoring of intentions (2004: 83). Therefore, humans' awareness of intention can be seen as a dependent process for its neural correlates.

Up until now, we have considered the cases of inducing an artificial intention, manipulating the perceptive times of the awareness. Now, I shall introduce a more extreme case: rather than inducing an artificial intention creating intention in subjects, in this case subjects were made into the belief of executing action while they have not made any action at all. Desmurget et al. (2009) applied direct electrical stimulation (DES) to subjects with brain tumors. Stimulations were made over various fifty seven sites, and some of these sites were responsive in terms of being related with stimulation of the production of intention (2009: 811). Three of nine patients acquired pure intention to move when they have been stimulated in various areas of brain, namely BA 39, and BA 40 (2009: 811) where these areas constitute the interior part of the parietal lobe (Sakurai 2017). When the intensity of the stimulation made higher (from 5 mA to 8 mA, lasts for 4 seconds) for two patients (from those three), they reported sensation for an illusory movement (Desmurget 2009: 811). In other words, by applying stimulation intensity higher, the initial pure intention artificially created became into the sensation of an illusory movement, and the patients became more deluded. These dialogues may make that phenomenon more apparent: one of the patients, at low intensity of stimulation, uttered that: "I felt a desire to lick my lips.", and at the higher intensity the report became "I moved my

mouth, I talked, what did I say?" (Even she had not utter any word) (2009: 812). It can be seen that by applying stimulation, intention can be artificially produced and even subjects can be made to believe the actions which they have not executed.

4.5 Conclusion

In this chapter I have tried to demonstrate that awareness of intention and the awareness of motor action are not reliable for Libet's experiment. The unreliability stems from their quality of being exposed to possible manipulations by both external and internal (in regard of subjects) modifications. I have raised two different type of manipulations: First, manipulations which are the result of Libet's paradigm itself; and second, manipulations that are not.

I appreciate possible criticisms for the demonstration of the second type, since they do not have anything with Libet's paradigm. In other words, Libet's experiment cannot be considered liable to such manipulations. Again, I claim that even the initiation of such manipulations would make us to go beyond the conditions in Libet experiment, it would not dismiss the point that awareness itself is not a pure phenomenon in regard of its dependence to neural activities. Therefore, possible manipulations (both within Libet's paradigm and outside of it) of awareness undermine its reliability to be utilized in Libet's experiment, until corrective measures are taken.

CHAPTER 5

THE EXTERNAL CRITICISM TO LIBET

In the last two chapters which have been just presented the above I have raised criticisms to Libet's experiment within his experimental paradigm. The reason was to provide a sufficient answer to the possible criticisms in regard of conceptual analysis of the experiment. Without making the internal criticism, the conceptual analysis I will make would be prone to the criticism of being tangential to Libet's definition of free will. However, since I have provided justice to the whole analysis by respecting Libet's paradigm and narrowed my criticism to the boundary of Libet's framework (*viz*, my internal analysis), now I have the legitimacy to criticize Libet on his concepts, and framework (*viz*, my external analysis).

5.1 Libet's Operational Definition of Voluntary Action for Free Will

The main basis for Libet's experiment was his operational definition of voluntary action for free will. The definition consists of these three conditions: it must be endogenous, there should not be any restrictions in regard of altering subjects' initiation and their performance, and subjects must possess the introspective feeling of being the cause of the action (1985: 529-530).

I propose that this operational definition will not suffice for the philosophical concept of free will. The weakness of the definition stems from its obsessive commitment to isolate and narrow the definition into those conditions. It can be said

that having an introspective feeling can be seen as a must, but it does not guarantee that in all instances this introspective feeling can be reliable. Second, while conceptualizing Libet misses the point that in everyday conditions our voluntary actions are subjected to restrictions for the initiation and the quality of our actions. These are indeed, these possible restrictions, altering factors for our actions. However, they shape our responses to the environment, and in result our voluntary actions are partially affected by them.

The most important weakness, I claim, is Libet's commitment for the condition of the endogeneity of the actions. For a subject to freely make her action, she does not to have solely endogenous processes. I claim that this condition dismisses many free willed actions under its scope. There are many actions both dependent upon external cues and still freely willed, such as responding to traffic lights, facing upon a moral dilemma, etc. The condition that these free actions must be internally generated will not provide a suitable distinction for whether these actions are free or not.

5.2 The Question of Action

Since I proposed that the condition of the endogeneity of the actions would not suffice, I will provide a more elaborate analysis of the nature of these freely willed actions. These four aspects need to be inquired: simplicity, reason, multidimensional nature of actions, and intentionality of actions.

5.2.1 Simple Actions will not Suffice for the Free Will Problem

One of the main issue for Libet's experiment is that it utilized a simple motor action (flex of wrist) as the basis for the claim for whether free will exists or not. Any result proposed from the data obtained from this simple action will lead to an unsuccessful generalization in the sphere of possible actions. What is meant by the sphere of

possible actions is that are actions not solely physical. In other words, their production can also be sourced from goals, plans, attitudes etc. Dismissing such actions in the experiment, and additionally generalizing the results of the experiments onto the whole dimensions of the actions will be an ambitious and misguided step to take.

There is a difference between a simple motor action and a more sophisticated, elaborate action in regard of their complexity. Simple motor actions cannot successfully fit into our complex real-world conscious experiences (Klemm 2010: 55). Therefore it can be said that generalizing an experimental result from a simple action into the whole classes of actions is nothing but an unwarranted step. Even if, let's say, Libet's experimental results are correct, it only demonstrates that subjects in their spontaneous, endogenous, simple motor actions have a preceding neural activity and this demonstrates that in these classes of actions they do not possess free will. Yet, it would not be enough to claim that all actions are not freely executed.

5.2.2 Free Will Actions can also be Based on Reason

It is common to come across to the question about a person why she did the action. The question gives away our intuitive idea that free will actions are based on reasons for agents. The reason is the answer why the agent did that particular action. It can be said that in philosophical context choices and actions under free will are investigated whether they had an underlying reason before them. Compatibilists and incompatibilists are in agreement on the importance of the notion of reason in free will discussions (Schlosser 2014: 250).

In most cases agents become able to do a freely willed action by rationalizing their reasons. Reasons reflect the underlying biases, information, expectations, and

emotions of the agent. By being subjected many different circumstances agents make their freely willed actions according to their reasons. Of course, weight of the reasons can vary between different actions and contexts. However, this does not show that Libet's simple motor action task is warranted in terms of its suitability in the philosophical context of free will.

One may be inclined to defend Libet's simple motor task by remarking the fact that the task also had an underlying reason. The reason for subjects to flex their wrists immediately, or by delay, or not flexing was their compliance to the given instructions by Libet. In order to comply to Libet's instructions subjects chose one of the three alternatives. As an answer, it can be proposed that indeed in this simple task subjects have a degree of freedom in their actions. However, this degree of freedom is uninteresting and indifferent relatively to the daily life actions.

Schlosser notes that philosophers (Hobart 1934; van Inwagen 1989, Kane 1996) contrast free will with "liberty of indifference" in the free will discussion (2014: 251). Liberty of difference is the freedom when such actions executed: choosing one option where all options are identical. As you can imagine, such freedom is philosophically irrelevant and uninteresting. Therefore, the simple motor action can be seen as an example of an action produced from liberty of indifference, relative to the daily life actions. And most importantly, you can now observe that even if neuroscience had proved that an action which is the product of the liberty of indifference made without free will, still it cannot be able to demonstrate that the other actions will be alike in terms of the result.

5.2.3 Free Will Actions are Multidimensional

The other important aspect Libet missed was the multidimensionality of free will. In other words, free will is related to many contexts: scientific, psychological, social, and ethical contexts. The neuroscientific study of free will made the concept to be artificially isolated from these contexts. A simple action of flexing is studied only in its physical context. This dimensional isolation also demonstrates the weakness of generalizing Libet's experimental finding to all actions. Mele (2013) puts **it *is*** nicely: "It is difficult to generalize from (alleged) findings about morally neutral decisions made under conditions of indifference to the conclusion that all morally significant decisions made in situations in which agents apparently are consciously weighing competing reasons are made unconsciously" (2013: 781).

5.2.4 Intentional Actions not Simple Motor Actions!

In the preceding subchapters we had already viewed having reason is an important aspect for free will actions. Such actions can be named as intentional actions, where their distinctive feature is that they are evaluated in regard of acting for reasons (Schlosser 2014: 250-251). Let us ask this question: If intentional actions, not simple motor actions, were investigated by Libet's experiment, would the experiment be successful?

The experiment will not be successful due to the fact that the timeframe used in the experiment is relatively short due to the fact that the phenomenon of free will requires more than hundreds of milliseconds. You can see that since intentional actions based on reasons, such short span of time will not suffice for the analysis. In order to evaluate how subjects rationalized their reasons, a larger timeframe will be

needed. In this argumentation it will be good to provide Gallagher's (2006: 119) depictive scenario:

> At time T something moves in the grass next to my feet. At T+150 ms the amygdala in my brain is activated, and before I know why, at T+200 ms I jump and move several yards away. Here, the entire set of movements can be explained purely in terms of non-conscious perceptual processes, neurons firing and muscles contracting, together with an evolutionary account of why our system is designed in this way, etc. My behavior, of course, motivates my awareness of what is happening and by T+1000 ms I see that what moved in the grass was a small harmless lizard. My next move is not of the same sort. At T+5000 ms, after observing the kind of lizard it is, I decide to catch it for my lizard collection. At T+5150 ms I take a step back and voluntarily make a quick reach for the lizard.

In this scenario, the intentional action is reaching (or you may say catching) the lizard. In order to investigate this intentional action in the context of free will one needs to explain the underlying reasons for the action, not only the process of the bodily movement. This is what Libet had missed, he identified and explained voluntary actions in terms of bodily movement and this explanation (and the paradigm of experiment) made him to investigate only the short timeframe of the action. Yet, the process of being aware of the lizard, then remembering that he has a collection of lizards, and then rationalizing catching the lizard for completing his collection necessitates a larger timeframe (2006: 120) for having a successful investigation. Gallagher (2016: 122) asserts how we should explain intentional actions in regard of free will as follows: "The relevant interaction to consider is the interaction between a situated mind-body system and its physical-social environment, a level of interaction found in the collecting of lizards, the helping of friends, and in the variety of deliberate actions that we engage in every day." It can be seen that what Libet lacks in his experiment is setting up such a system and environment pair.

5.3 The Fallacy of Equivocating the Notion of Free Will to Choice

The other criticism, other than the criticism of action, we may propose against to Libet's experiment is that it did not consider such elements of long term planning, decision making, etc. Yet, I need to emphasize that I understand the difficulty of observing and setting up a proper scientific methodology for such tasks. These tasks as planning, decision making in fact can be seen having a very introspective quality and it is difficult to setting an objective rule for reporting and measurement of how people "freely" made their plans and decision.

Even we accept the above practical limitations as possible excuses for not aiming to make experiments on these phenomena, still a theoretical criticism will be in force. The criticism is that Libet's way of narrowing down of the studying area of free will into a relatively simple "urge/desire-conforming or vetoing/executing or not executing" chain undermines the conceptual grasp of free will.

Only attaining to observe the participants' status -of conforming to the urge or suppressing it- produces the indirect false assumption that action of choice is equivocal to free will. Let us investigate more on this issue by providing a depictive thought experiment. Let's say you are in front of an ice cream truck. There are only two flavours left, strawberry and chocolate (and the seller is a weird person he does not sell both at the same time). You have given an opportunity to choose, and there is no one together with you, like your cute daughter always forces you to buy the strawberry flavoured. You have picked up the chocolate one. Based on the conditions you were under and the behavior that you have made, would it be legitimate to consider that you have free will?

The answer I propose is no (even it may seem radical to most of the people), you do not have free will in the full sense, rather you have only shown us that you have possessed one of the elements of free will. An ordinary person would accuse me of being crazy and would say that: "Of course I have free will! If I had not have free will it would be the case that I could not be able to pick one!"

As a traditional answer you would except from me that I will submit to your straight-forward natural criticism and accept that indeed you have a free will. Yet, I shall not provide you that answer! Let's think that I accepted your criticism, but I can still give you a counterargument. Let us assume that there is a person that has developed a disability at some past time that she can only make choices, and she does not possess ability to further plan, etc. When she has given choices she can just choose whichever her urge persuade her. It is more like a generalization of Libet's experiment into a person's life. It is nearly the same conditions: participants flex their wrists when the urge comes or veto it; and in Lucy's case she makes a specific action only depending on her initial urge.

One should distinctly and carefully realize that if one accepts that the conditions and methodology as enough in Libet's case, then also you should accept that Lucy has free will. You may say that it is obvious that Lucy and the participants of Libet's experiment are different qualitatively. You may proceed to claim that, therefore Lucy is not applicable to be considered in the discussion of free will. Yet, this answer reflect your indirect and inherent confirmation of my counterargument.

Let me explain you, why this is the case. What is the difference between Lucy and the participants of Libet's experiment? Obviously, you do not see Lucy as a normal functioning human where the participants are. Lucy only make choices depending on her urges for every given time, where the participants of the Libet experiment can

also make long term plans, intentions etc. Yet it should be asked that if Libet only focused on the moment of having an urge and executing (or not executing) the action in his experiment, would there be any difference between Lucy and the subjects? In the experimental conditions the subjects are like Lucy, they only wait for the urge and then execute the action or not. Therefore if you say that Lucy does not possess free will, I can reply you that the subjects also do not possess free will. Because, in the end, under the experimental condition of Libet they are the same. Now, you can see that appealing only to the chain of "urge/desire-conforming or vetoing/executing or not executing" is not enough for grasping the concept of free will.

5.4 A New Conceptual Understanding: Free Will as an Aggregate Continuous Phenomenon

From the previous subchapters I have tried to provide the conceptual shortcomings of Libet's notion of action and free will. Now, I shall propose a simplistic, and humble concept of free will. This conceptualization is not designed as an ultimate one, but its goal is to serve as an introductory, and new proposal which in the future can be further developed and made suitable for neuroscientific experiments.

As I have claimed in the earlier subchapters, free will should not be equivocated with the notion of choice. While choice can be seen as a discrete (in terms of temporality) phenomenon, I claim that free will is not discrete. Rather it is an aggregation of choices and decisions that we have, and aggregation of our statuses of being aware, and having recognition of phenomena we came across of. Therefore trying to provide a relevant timescale for a concept of aggregation would prove be difficult to be successful. The concept of free will is just a summarization tool, made up by us, for the aggregation of the above mentioned. It is not something as itself; it is just a mere

phenomenal aggregation! Or can be put in Hallett's (2007: 1188) words: "Free will is an entirely of inspection."

It leads us to the inquiry of this question: If the concept of free will named as the aggregation of above-mentioned phenomena, then what has Libet experimented in his studies? Having the subjects to wait the urge to come to them, and let them execute their simple actions cannot suffice to wholly capture whether they have free will or not. The main problem for Libet's study is its narrow scope in its experimental study. This narrow scope has resulted for having a narrow definition of free will. The concept of free will cannot be created and inquired by only just attending to simple actions, such methodology would undermine the significance of other phenomena that establish free will. Let us name this phenomenon as the "simplicity limitation".

For the second limitation, as I mentioned earlier, it can be proposed that study in the timescales of hundred milliseconds cannot capture agents' free will successfully. If free will is aggregation of phenomena of choices and decisions, of our statuses of being aware, and having recognition of phenomena that agents come across; it can be seen that the relevant timescale should be at least in seconds. This is the "timescale limitation" in Libet's study.

These two limitations inherently demonstrate us the two main factors that should be considered in the inquiry of free will: complexity of the actions, and the timescales for the relevant discussion for free will. In order to create a sufficient concept of free will, one should lay the conceptual framework of how complex should an action must be (in regard of how an action can be relevant in the context of free will), and define "what the relevant timescale for free will" is.

Now, let me lay the foundations of those two conceptual frameworks. First, in order to define an action to be sufficiently complex in the context of free will, I claim that that action should include all of the phenomena in its making and also in its result. For instance, one cannot consider the action of the movement of her leg when someone hit her knee with a hammer as a sufficiently complex one in the context of free will, since in its making the action has not been preceded by a relevant decision by the agent.

Second, the conceptual framework for "the relevant timescale for free will" should be inquired. I shall claim that the relevant timescale for free will is inherently related with the timescale for our continuous experience. In other words, free will –as an aggregation of phenomena– can be seen as this continuous flux of conscious experience. The phenomena lie within this flux, and the totality of this flux, i.e. the aggregation, is the free will.

As a straightforward criticism to my conceptual definition of free will, one can put forward that the definition may eventually lead having the timescale of the whole lifespan of an agent, since conscious experience of an agent lasts until her lifespan come to an end. Therefore, if one follows my line of reasoning, then there is no suitable mean to experiment the concept of free will, since it lasts through the whole lifespan.

It is really an important criticism, in such a way that it remarks the difficulty in inquiring and experimenting on a concept based on aggregation. How one would have an aggregate concept to be studied and to be experimented? The answer to this question, in my opinion, lies within the status of the aggregate concept where whether its phenomena created it in a conjunctive manner or a disjunctive manner. In

simpler terms, if the aggregate concept of free will is conceptually formulated as a conjunctive aggregation (Ag∧), then the whole concept is structured as the conjunction of all phenomena within the whole timescale of lifespan. In other words, it is the holistic view of free will that where all of the instances of relevant phenomena within the stretch of the timescale should be considered as being in the absolute unity. Therefore studying a subpart of the conjunctive aggregation cannot be epistemically sufficient for the inquiry of the whole. The whole should be studied from the holistic perspective. Let me name this modified version of my definition free will as the conjunctive-aggregate (Ag∧) free will.

In contrast, if free will is structured by the disjunctive aggregation of the phenomena, then it can be said that we are permitted to study the subpart of the whole aggregation. This is the disjunctive-aggregate (Ag∨) free will. Therefore, one is not anymore to be forced to take the relevant timescale for free will as the timescale of the whole aggregate; a sufficiently relevant timescale will work.

The main importance is to sufficiently specify which timescale and which set of phenomena will be relevant. As a simple depiction, I can provide you with a simpler explanation: Think free will as a coherent aggregate set. Instead of looking all the elements within the set, if one can be able to specify a coherent subset within this aggregate set one can be able to inquire the whole aggregate set via inquiring this subset. Therefore, even in all experimental studies where the timescale and the phenomena under the study is limited due to practical reasons, one can still inquire on free will sufficiently by studying the relevant coherent subset.

It can be seen that in order to develop the framework the question of: “How one can specify such a coherent subset?” should be answered. Even I do not, now, have an

exhaustive answer to this question, Lavazza&Inglese (2015)'s proposal for operationalizing free will in terms of "capacity" can provide us an instructive road map for seeking such an answer. Lavazza's main proposal is that bridging the gap between neuroscientific and social and moral understanding of free will, by resorting to cognitive abilities. These cognitive abilities can be measured by the means of neuropsychological tests, and the focal point of their measurement will be the executive functions, which are the backbone of enabling agents to plan and organize their volitional actions (2015: 45). These executive functions are important in such a way that, "they refer to the set of mental processes necessary for the development of cognitive-behavioral patterns adaptive in response to new and demanding environmental conditions." and their domains are: planning, evaluation, inhibitory control, modification of the possible response, attentional control and the working memory (2015: 45-46). Now, you can see that by measuring the quality of these executive functions one can open the path for the question of specifying coherent subset for free will. The elements of coherent subset must be substantiated in such a way that they can correspond these executive functions, and in result by being able to measure the quality of these executive functions one can assess whether those elements successfully cohere to each other.

Now, I shall end the introduction of my conceptual framework of free will. I believe that there is a possibility that in the future neuroscientists and philosophers by searching for possible answers to the question of how one can specify such a coherent subset, and inventing new experimental techniques, can provide a successful modification to the concept of free will.

CHAPTER 6

CONCLUSION

In this thesis, I have investigated the notion of free will from the both perspectives of neuroscience and philosophy. Libet's experiment is the main experiment for the thesis due to its importance for being a pioneering experiment to make free will analyzable in scientific grounds. This achievement is attained by Libet's operational definition for voluntary actions. By basing his experiment onto this operational definition Libet proposed two results: Since RP temporally precedes the awareness of intention, free will does not initiate voluntary actions (1983: 635). Second, since subjects were able to veto their action before the motor initiation -even they have been subjected to the arousal of urge- free will has the permissive role of the execution of actions (1983: 641).

I criticized Libet's interpretations of the experiment from two perspectives: within his framework, and about his framework. The former is the internal criticism where I have criticized the alleged specific role of the RP by providing experiments showed that RP also occurs in non-conscious actions, non-motoric processes, and can be seen as a marker for a general preparation. The second half of the internal criticism consisted of demonstrating the unreliability of the awareness of intention and the awareness of motor actions. I have provided experiments where the awareness can be manipulated, induced and even artificially created.

The latter is the external criticism where I have criticized Libet's operational definition and consequently his concepts. I provided a conceptual analysis of the notion of action Libet utilized, and tried to demonstrate that the simple motor action that Libet utilized was primitive in the context of philosophical concept of free will. I claimed that Libet have not successfully considered intentional actions, reasons, and the multidimensionality of the notion of free will.

I criticized that Libet mistakenly equivocated the notion of free will with choice. By analyzing the shortcomings of Libet's framework I have provided a simplistic and introductory framework for free will. According to this framework free will is nothing but an aggregation of phenomena of awareness, recognition, and action. It should regarded as a continuum of those phenomena and should not be equivocated with any discrete phenomenon (e.g. choice). The quality of continuum provided two different concept of free will: the conjunctive-aggregate (Ag∧) free will and the disjunctive-aggregate (Ag∨) free will.

I proposed that by identifying the elements of the coherent subset of phenomenal elements, and inventing successful experimentation techniques in the future the concept of free will can be brought more successfully into the scientific field. I cannot guarantee that such commitment would bring a universally accepted notion of free will which operationalized by science. Yet, at least I believe that it is the way we should take if we want to have a successful result. Even if, I believe that, we may not reach to a successful conceptualization, at least this effort will provide valuable findings for the philosophical context.

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