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Different kinds of decisions and an experiment on unconscious generation of free decisions: A conceptual analysis

Diferentes tipos de decisões e um experimento sobre a geração inconsciente de decisões livres: uma análise conceitual

Beatriz Sorrentino Marques[1]
Universidade de São Paulo

Abstract
Philosophical issues such as free will and the role of consciousness in human action have become a topic of interest to neuroscience. While this contribution is of great value to extend our knowledge on these issues, the lack of clarity about the concepts being investigated may interfere with the interpretation of the relevant results. An interesting experiment (Bode *et al*., 2011) that investigates whether decisions are generated consciously or unconsciously suggests a conclusion about whether human beings decide freely. These issues are considered relevant philosophical issues, but the experiment lacks conceptual precision, and this weighs on the interpretations of data and results. I argue that further conceptual analysis of *decisions* shows that the experiment investigates one kind of decision, while it unwarrantedly draws conclusions about human decisions in general. A better understanding of what is considered to be a decision helps clarify to which extent the results show that decisions are generated unconsciously. This shows that conceptual precision is crucial for research on the area as well as methodological rigor.

Keywords: decision, intention, consciousness, brain activity.

Resumo
Questões filosóficas como a do livre-arbítrio e o papel da consciência nas ações humanas se tornaram temas de interesse para a neurociência. Porém, ao mesmo tempo em que essa contribuição é valiosa para estender o nosso

[1] Doutoranda da Universidade de São Paulo. Departamento de Filosofia. Av. Professor Luciano Gualberto, 315, sala 1007, 05508-010, São Paulo, SP, Brasil. E-mail: biasorrentino@usp.br

conhecimento a respeito dessas questões, a falta de clareza conceitual a respeito dos conceitos que estão sendo investigados pode interferir na interpretação dos resultados. Um experimento interessante (Bode *et al*., 2011) que investiga se decisões são geradas consciente ou inconscientemente sugere uma conclusão sobre se os seres humanos decidem livremente. Essas questões são consideradas questões filosóficas importantes; entretanto, como falta ao experimento precisão conceitual, isso pesa na interpretação dos dados e dos resultados. Argumentarei que uma análise conceitual das *decisões* mostra que o experimento investiga apenas um tipo de decisão, enquanto sugere uma conclusão injustificada sobre as decisões humanas de modo geral. Uma melhor compreensão do que se consideram decisões ajuda a clarificar até que ponto os resultados mostram que as decisões são geradas inconscientemente. Isso mostra que precisão conceitual é crucial para pesquisas nessa área tanto quanto precisão metodológica.

Palavras-chave: decisão, intenção, consciência, atividade cerebral.

Introduction

In *Tracking the Unconscious Generation of Free Decisions Using Ultra-High Field fMRI* (Bode *et al*., 2011), it is claimed that it is possible to decode the content of a free decision up to 7 seconds before the subject is aware of what this content might be—i.e., before she is aware of what she will decide. Functional magnetic resonance imaging (fMRI) showed that relevant patterns of brain activity could be decoded to yield predictive information about the decision, and showed that the relevant activity stabilizes over time as the moment of its awareness approaches.[2]

The research aimed at investigating the relationship between the subjective aspect (consciousness of deciding) and the objective aspect (brain activity) during a decision task. It follows the line of research developed and made famous by Benjamin Libet (1985, 1999; Libet *et al.,* 1983); both the participants' reports about their conscious states and measurements of the relevant brain activity were taken into consideration. Bode *et al*. claim that their research disclosed new information about how humans make decisions. Furthermore, the experimenters assume that our experience of freedom would be an illusion if our actions were decided upon unconsciously, and their results lead them to conclude that our decisions are generated unconsciously.

I will argue that the term *decision* can be understood in different ways and that Bode *et al*. are investigating a specific kind of decision, which does not yield evidence for drawing conclusions about decisions in general. Therefore, their conclusion is ungrounded.[3]

In the second section the experiment will be described. In the third section I will distinguish between four different kinds of decisions, extending Alfred Mele's (2000, 2003) conception of deciding. In the fourth section I will argue that the experiment reported in Bode *et al*. only investigates one kind of *decision*; therefore,

[2] The experiment (Bode ***et al.***, 2011) aimed at reproducing an experiment by Soon ***et al.*** (2008), focusing on a smaller area with the objective of being more accurate.

[3] Similarly, Mele (2009) objects to Libet's (1985, 1999; Libet ***et al.***, 1983) generalization of his findings. Libet generalizes his conclusion that the brain events related to the preparation to act start well before the subjects are conscious that they want to flex their finger; as if this conclusion could be applied to all intentional actions. Like the experiment in question (Bode ***et al.***, 2011), the scope of Libet ***et al.***'s (1983) experiment seems to be too limited to allow for conclusions about all human intentional actions.

the experimenters have no grounds to draw conclusions about human decisions in general. Finally, in the fifth section I will argue that the way that the experimenters conceive of our experience of freedom makes it impossible for their experiment to investigate this experience, so their results give them no grounds to claim that this experience is an illusion.

The experiment

The participants in the experiment were instructed to hold two video game joysticks, one in each hand, and then immediately push one of the buttons, right or left, when they decided which button to push (Bode *et al*., 2011). There was no time restriction on the task execution. The participants should just relax, not think about the task they should execute, and not previously plan which button to press. They should just wait until they had made their decision.

The participants were told to only observe a screen on which a consonant appeared every 0.5 s while they waited to decide (Bode *et al*., 2011, p. 2). They were supposed to report which letter was on the screen as they became aware of their decision, in order to allow the experimenters access to the moment at which they became aware of their decision. The experimenters used fMRI to observe the subjects' brain activity occurring during the experiment.

The experiment is interpreted in the following manner:

> Interestingly, we observed an increase in similarity between patterns with increasing temporal proximity to the conscious decision. This increase in correlation was mirrored by the increase in information content about the decision outcome. Thus, one possible explanation for this finding is that during the unconscious phase of intention-formation, the patterns slowly "evolved" towards the final conscious decision, comparable to a diffusion process postulated for fast, stimulus-driven decisions. This hypothesis states that once a threshold is crossed (a certain pattern is stable enough), a conscious decision is made and activation patterns lose their predictive power afterwards (Bode *et al*., 2011, p. 9).

Bode *et al*. (2011) describe as their main discovery their finding that the content of the decision[4] is encoded in the brain activity well before the subject became conscious of her decision.[5] An explanation as to why the experimenters considered this their main finding may be because they expected that the consciousness of the decision would carry this information (about which button the subject would press) and not the brain activity preceding consciousness of the decision. In the fifth section it will be argued that this led Bode and others to believe that the agent is not free to decide which actions she performs.

Because it was possible to decode which button the subject would press a few seconds before the subject reported being conscious of her choice, the observed activity patterns were interpreted as a prediction of the subject's decision before

[4] The content of the decision would probably be something like "press the right button" or "press the left button".

[5] "It was possible to decode the decision outcomes of such free motor decisions from the pole of anterior medial prefrontal cortex (BA 10) and the precuneus/posterior cingulate cortex (PCC), up to 7 s before subjects were aware of their intention. The results clearly pointed to frontopolar cortex (FPC) as one possible site of origin for free decisions" (Bode ***et al.***, 2011, p. 2).

the subject herself was aware of the decision she would make.[6] Bode *et al*. claim that the activity patterns carrying the *decision information* strengthened during the seconds throughout which the activity was observed, but the subject had not yet reported to be conscious of her decision.

From the results, the experimenters questioned the general notion that we make our decisions consciously in the sense that we consciously originate the decision. They claim that this could be an illusion (Bode *et al*., 2011, p. 1), given that the participants of the experiment were not aware of their decisions until well after the predictive brain activity had already begun.

Conceptual background

Decisions can be reflective or unreflective

What Bode *et al*. (2011) are investigating, however, is not what they are drawing conclusions about. This is the case because they are investigating one kind of decision, while they are drawing conclusions about decisions in general. Therefore, their conclusions are unwarranted. Some may even refuse to call these decisions; nonetheless, even if we accept that they are decisions, this would still not allow for the point made by the experimenters.

In this section, I will distinguish between four kinds of decisions: active and reflective decisions, active and unreflective decisions, non-active and reflective decisions, and non-active and unreflective decisions. More will be said about the different kinds of decisions further in this section, but first some previous distinctions must be made.

Consider these two situations: when I decide to get myself a new sweater, I take into consideration how much I need a new sweater, the current season, and my budget. This is very different from deciding which key to press when my computer screen shows the message "press any key to continue".

In the examples above there is a difference between the kinds of decisions I make in each one.[7] Pressing any key might be a non-active kind of decision, as will be explained. This is different, though, from deciding whether to buy a sweater based on my needs and available financial resources, or from deciding to take a vacation instead of working. We may very well call these decisions, but there seems to be a difference between them. What is the difference?

At first glance it is easy to see that the decision to purchase the sweater involves reflection, while the one about which key to press on a keyboard out of the many available keys does not involve reflection. I will distinguish these two kinds of decisions by calling the former *reflective decisions* and the latter *unreflective decisions*. The decision about which key to press does not depend on reflection at all. It is indifferent; as long as I press one key, the task is complete. What I would like to call attention to is that Bode *et al*.'s (2011) experiment does not involve decisions of the sweater buying kind.

[6] Subjects were instructed not to pre-plan their decisions, and Bode and others believe that "our detailed behavioral analysis confirmed that subjects did not use any systematic thoughts to consciously prepare their decision ahead of time. They acted as instructed and were spontaneous" (Bode ***et al.,*** 2011, p. 9).

[7] Mele notes the distinction between picking and deciding in ***Effective Intentions*** (2009). However, the distinction that Mele (2009, p. 84-85) draws is between picking amongst indifferent options and deciding amongst options the agent actually deliberates about. It is the distinction between arbitrarily picking an option and deciding that involves deliberation.

Decisions can be actions or not active

Nevertheless, this is not the only distinction that ca be made amongst decisions. Intending to do something is not an action in itself, while deciding may be. Deciding may be actively doing something. For instance, if I have doubts about what to do this afternoon and then decide to go to a lecture at another department, that is something I do, and I may also acquire the intention to walk there (in opposition to taking the campus bus).[8] I do not need to *actively* form this intention, it is acquired as a result of my decision, and acquiring this intention is not an action (Mele, 2003). Deciding to go to the lecture was an action of mine.[9] So this is also a distinctive aspect about decisions; they may be *active* or *non-active*.[10]

A question, however, remains. If the acquisition of an intention already plays a causal role in the production of intentional actions and *active deciding* would be intentional under some description (Davidson, 1980), why would we need to decide? Why would we need to *form* intentions? And in what circumstances would a decision about what to do be needed? In various everyday situations the agent simply acquires the intention to do A, without the need to make a practical decision. So, a decision is only necessary in circumstances in which the acquisition of an intention is not enough, or does not happen.

According to Mele (2003), these decisions (that are actions) are made in situations where there is a practical uncertainty that has not been resolved by a cognitive decision. When the agent makes a decision about what is best to do without thereby acquiring an intention to act accordingly, then she needs to take a further step: decide what to do. Thus, these decisions occur in situations where the agent has doubts about what she should do; for example, Georgia is in doubt about whether to accept an invitation to dine with her friends or stay home to watch the live broadcast of a concert. Even though she suspects that she may have more fun with her friends, she still does not consider the case closed until the time comes when she must get ready to leave or let her friends know that she will stay home. Georgia knows that she needs to make a decision.

In cases when the agent does not actively decide what to do, once the agent evaluates what is best to do, her intention to decide what to do gives her motivation to generate an intention in accordance with the conclusion of her assessment and to act accordingly. When actively deciding what to do, the motivation to solve the practical uncertainty in question already present in the intention to decide what to do

[8] One of the characteristics of decisions is resolution, as is the case of intentions. So, when an agent, Sara, intends to go to a lecture in the afternoon, we do not think that maybe she will go, or that she wants to go, or that she is reflecting on whether she will go. Unless something out of the ordinary happens — according to this theory intentions may be revoked (Mele, 2003, 2009; Bratman, 1999) — we can assume that Sara will go to the lecture. Suppose I am in doubt about whether to go to the library this afternoon or meet Sara at the lecture. If I then decide to go to the lecture, I am not still deliberating about whether to go and I am not unsettled about whether I will go. Having decided suggests that I will be at the lecture this afternoon (for I have formed the intention to be there), and Sara can expect me there.

[9] Mele (2003) claims that decisions to act are actions of forming an intention to do A. And these decisions are actions just like the action of lifting one's arm; however, decisions are mental actions. I disagree that decisions to act are always actions, since I claim that there may be non-active decisions, which Mele (1992, 2003) would probably call intention acquisition.

[10] A distinction between decisions to act and decisions that are not about action could also be made (Mele, 2003). For example, I can reflect and decide that the global use of the method of Aztec agriculture would be better to preserve the planet's resources. Or a decision about what would be best; e.g., in order to not throw the local environment out of balance it would be best if it rained soon. These examples are not of decisions to do something, i.e., to act. It is clear that the experimenters wished the participants to make a decision to act: to push the left or right button of the joystick; in this investigation, however, we will not take this distinction into consideration.

explains the agent's disposition to form an intention in accordance with the deliberation about the issue once she reaches a conclusion. So we have reasons to believe that we at least sometimes actively decide when we have doubts about what to do.

Different kinds of decisions

Taking into consideration the distinction drawn between *reflective* and *unreflective* decisions, one concludes that *active* decisions may be *reflective* or *unreflective*. Nonetheless, decisions may also not be of the *active* kind. I distinguish between *active* or *non-active* decisions. Still, more conceptual clarity is needed before analyzing what kind of decision the subjects in Bode *et al*.'s (2011) experiment were making.

It is now clear that there may be four different senses of decisions: (i) active and reflective decisions (I shall call these ARD, for short), (ii) active and unreflective decisions (AUD), (iii) non-active and reflective decisions (NRD), and (iv) non-active and unreflective decisions (NUD). I believe that it is not polemical that we decide in the active reflective sense described above; after all, this seems to be what we commonly mean when we talk about deciding. However, there is also active deciding in which the agent makes a decision without reflecting.

For instance, suppose I have some spare time to do my laundry, but I do not know whether to wash my blacks or colors first. I must decide soon, because I only have so much time to spend on this task, but I really see no reason to wash either of them first (I do not need to wear any of these clothes any time soon). Actually, since I can wash one pile of clothing first and still have time to wash the other pile, there really seems to be no reason to prefer doing either task first. Still I must decide soon or I will do neither. It is just a question of deciding with which pile to start. In this case I may actively decide to wash the blacks first without going through a reflective process beforehand. I bring myself to *form* a decision. Since this kind of deciding is an action, just as reflective decisions, they fit into the *active* decisions category. It is a case of AUD.

I do not mean that in this case the agent decides for no reason. There may be a number of unconscious reasons, biases, and previous experiences that influence her decisions. These subjacent mechanisms probably tip the scale. All that I mean is that the agent does not actually base her decision on any previous reflection about what to do. She just decides, perhaps biased by the cited factors.

There are also decisions that are *not active* in the sense that they are not actions, but the agent acquires an intention to act in accordance with one of the action courses open to her at the time. It is possible for a decision to be reflective, but not active, in the sense that it leads the agent to *acquire* an intention to act in accordance with the outcome of her reflection without the need to actively form the intention. This is the case of NRD. Once the agent's reasoning favors an option, she acquires an intention to act accordingly; for example, one may reflect about what would be the best move in a chess game. This deliberation surely is active; however, once the agent comes to a conclusion about which would be the best move—say knight on c6—she may just acquire the intention to act accordingly, which is not active.[11] An interesting point is that in this kind of decision the agent is not faced with unresolved uncertainty. Reasoning about what is best to do resolves

[11] This becomes even clearer if the agent is just watching a chess game, say her friends are playing chess. She may watch and deliberate about which would be the best move to make and come to a conclusion about it. This would be her decision, but she would not have to perform the action of deciding. She simply decides once she figures out the best move, and she will also not act on that conclusion because she is just the audience to the game. Had she been playing, she would probably acquire the intention to act in accordance with her decision.

the issue for her, so there is no need for an active decision in the face of a question about what to do.

There is, however, a sense of decision that is non-active and unreflective, NUD, which is what happens when an agent does not reflect about her options, because she is not faced with any uncertainty at all, but we may still call this a decision in some sense. The agent simply acquires the intention to take a certain course of action; this is the case of common intention acquisition.[12] An example is the decision about which key to press when the message "press any key to continue" appears on my computer screen. Usually I just press any key with either my right or left hand.

If someone asked me when I had become conscious of my decision about which key to press, I would probably say that I was not aware of any decision at the time; I just pressed any key. Or if someone asked me to pay attention and report on the consciousness of my decision next time I press a key in this situation, then I would probably report on becoming aware of my resolution to press one of the keys. But that seems much like acquiring an intention to press the key and becoming aware of it.

Deciding in the experiment

What kind of decision is investigated by the experiment discussed by Bode *et al*. (2011)? I will argue that the experiment in question investigates NUD, but the experimenters draw a conclusion about decisions in general.

Since subjects were asked to press a button, either on their left or right hand joystick, without thinking about it, while relaxing and waiting for the decision to come up, it is clear that unreflective decisions are the focus of the experiment. "Subjects were instructed to passively view the stream of letters, relax, and refrain from thinking about the upcoming task" (Bode *et al*., 2011, p. 2). If they followed the experiment's instructions to not think about or pre-plan their decision, they did not make reflective decisions.[13]

Furthermore, if subjects followed the instruction not to think about the upcoming task, it is hard to imagine that they might have decided in the active sense of deciding at all. It is unclear how one can make a decision in the active sense without entertaining the question about what to do, or at least that there is a question. If one does not even raise a question about what to do, then there is no decision to make.

I have tried to actively decide between sitting on the left or the right side of my dining table without thinking about the task that I should perform. In order to do that, I must think about something else. So I find myself thinking of other things until either: (i) I remember that I must decide, in which case I have failed to not think about the task; or (ii) I acquire the intention to sit on the left (or right) and then I become aware of it, in which case I have not actively decided. Another possibility would be to have preplanned the decision, but this was not allowed in the experiment.

[12] In this sense I consider non-active unreflective decision interchangeable with acquired intention.

[13] Bode ***et al.*** (2011) only used the results from participants who naturally balanced their decisions. The subjects were not informed of this in order not to bias their decisions. Nonetheless, Lages and Jaworska (2012) suggest that in this kind of experiment, in which the task involves pressing a left or a right button, subjects will be inclined to balance out their button pressing and will keep track of which button they have previously pressed in order to do so. Hence, it is hard to rule out this tendency as some form of pre-planning. See Mele (2014, p. 202) for a distinction between inclination and decision.

The instruction to avoid thinking about the options takes away any practical uncertainty the subject might be faced with. Because if one must not entertain the thought that one must decide between the options, then one surely does not have any doubts about what to do, nor is one troubled in any way by options. The question about what to do never arises. So, the subject could not have decided in order to solve a practical uncertainty, since there was no uncertainty that needed further action or reflection.[14]

If the subjects complied with the experiment's instructions, their decision was of the NUD kind (Bode *et al*., 2011). From what was discussed above, it is probable that they acquired the intention to press one of the buttons and then became aware of their intention.

After all, we do not need to actively decide beforehand to perform every one of our actions. If active decisions were necessary for every action production, we would be less efficient agents and we would take longer to act, especially if it were the kind of decision that requires reflection to be involved in the process. Also conscious processes are slower and take up more resources, so if we needed to make a reflective decision every time we acted (assuming that reflection is conscious), action production would be slower and more energy-consuming.

On the other hand, the acquisition of an intention is not an action. Agents may passively acquire intentions, and we do so frequently (Mele, 2003). For instance, when I decide to go to the movie theatre to watch a particular movie, I acquire the intention to buy myself the tickets without having to actively form the intention or even think about it.

The acquisition of an intention to act now—or the neural activity that realizes[15] it—is the last step before acting. This last step involves a commitment of the agent to the action, in the sense that once the agent acquires the intention to do A, she is settled on doing A.[16] So the acquisition of an intention is what initiates the action mechanisms. In the experiment it could be that the activity pattern strengthens until the subject settles on the action course, i.e., acquires the intention to act in accordance with the content encoded in the activity pattern.[17]

Brass and Haggard (2008) defend the hypothesis that the production of every intentional action involves at least three information-generation components that they call deciding: action selection, i.e., (a) *what* action will be executed; (b) time selection, *which* would generate information about when the action should be executed; and (c) information generation of *whether* one should act at all, which could involve a veto of the implementation of action or not[18]. All these three action generation processes would depend on different neural processes. Acting intention-

[14] Waller (2012) makes a related point. She points out that some neuroscience experiments, such as Libet ***et al.*** (1983) and Soon ***et al.*** (2008), do not test what experimenters intend to test—conscious intentions and decisions, respectively—in a relevant way because the kind of action that subjects are instructed to perform in the experiments is too far from our everyday actions.

[15] I use the term realize to claim that there is a relation between mental events and brain activity, but I remain neutral as to what relation this might be.

[16] Unless the agent revokes her intention in time to prevent the triggering of the relevant action mechanisms (Bratman, 1999).

[17] Haggard (2008) also suggests that the frontopolar predictive activity pattern found by a similar experiment—Soon ***et al.*** (2008)—could antecede the activity observed in pre-SMA and SMA; he associates the latter to what he calls what decision and when decision. Haggard claims that the activity described by Soon and others may be explained by forethought: "These patterns may represent an earlier stage in the causal chain that generates actions (see above). Neural processes such as the readiness potential must clearly have antecedent causes, and more-sensitive measurement techniques may reveal the earlier stages in the chain. Alternatively, these very early activations might be associated with forethought and longer-range conscious intention, as the same brain areas are known to be involved in prospective memory" (Haggard 2008, p. 942).

[18] Krieghoff ***et al.*** (2009) also corroborate this hypothesis.

ally (considered purposive) would require this information generation, which Brass and Haggard (2008) contrast to stimulus-driven actions, like reflexes.

So, following the hypothesis that information generation processes are part of the production of action, we may accept that in every situation in which an agent may act she is faced with multiple possible courses of action. Say I take a short break from work. I will have many options about what to do next: I may now return to work, check the message I just got on my phone, get one more slice of cheese, make some tea, etc. In reality, it is hard to name the courses of action that would be open to me because there are so many of them.

We may suppose that factors such as my skills, emotional situation at the time, current interests and concerns, past experiences, and psychological dispositions may help limit the action courses that I would at least be inclined to take. Given the kind of person I am, my interests and my daily routine, I will probably just get back to work for now. Most of the times I do not need to actually reflect on what I will do, I just follow my routine. At other moments, however, I may need to make a decision about it; e.g. I may have doubts about what to do when there is no food left in the house, but I still have work to do.

This openness of options would then be part of all action production; nonetheless, this does not mean that every action depends on the agent deciding what to do in a reflective or active sense of deciding. For example, I do not reflectively and actively decide in this sense about whether to take my purse when I leave the house; I just take it. The acquisition of an intention settles my course of action. So, if it is the case that in the process of producing every action there is this openness of options, but active decisions are not necessary for all of them, then this kind of decision is not called for simply by having options. We may conclude that active decisions are called for when there is actual doubt about what to do.

If the subjects were deciding which button to press, then their decision was a NUD, if they complied with the experiment's instructions (Bode *et al*., 2011). Possibly they simply acquired the intention to press one of the buttons and became aware of that acquisition at some point. However we interpret the experiment, one thing seems clear: it does not study reflective or active decisions.

Since UND are a different mental state, it is probable that they have different neural correlates than other kinds of decisions, and this would be what was observed in the experiment.[19] However, this evidence does not offer any information about the neural correlates of the other kinds of decisions described above. It might not be possible to make any predictions about the content of decisions before awareness in the case of other kinds of decisions; for different brain activity might predict decisions of one kind well in advance, but not of other kinds.

It is important to know what is being investigated in their experiment because it does not match the conclusions being drawn from it (Bode *et al*., 2011). I have argued that the task is too specific; the subjects are instructed to carry out a NUD in the experiment. However, the problem is that it is not about this sense of decision that the experimenters draw their conclusions. On the contrary, Bode *et al*. (2011) draw conclusions about human deciding in general.

When we talk about decisions, we usually mean it in a narrower sense than NUD. The word decision is used when we are deciding our plans for the evening, career options, where to go on vacation, what to eat for lunch, or even for deciding which clothes to wear.

[19] One may argue as well that the different kinds of decisions have different functional roles.

Of course, by this I do not mean that the word can never be used to refer to NUD. However, Bode *et al*. do not make clear in which sense they mean their use of the word, nor do they qualify their usage of it: "These findings support the conclusion that frontopolar cortex is part of a network of brain regions that shape conscious decisions long before they reach conscious awareness" (Bode *et al.,* 2011, p. 12).[20] So, when they draw these conclusions, they seem to be making a claim about decisions in general, which their experiment gives them no ground to make.

The reference to "conscious decisions" (Bode *et al*., 2011, p. 12) and to the "ability to consciously choose our actions" (2011, p. 1) indicates that the experimenters might be referring to all kinds of decisions, not only NUD. However, I have argued that their experiment investigates only one sense of decisions: NUD. Therefore, this specific task does not warrant extrapolating their findings to all kinds of decisions.

Free will

The experimenters also make claims about human freedom in making decisions. What *freedom*, or *acting freely*, is can be controversial.[21] For this reason, I will use the term here in the way that Bode *et al*. (2011) use it. Here is how they understand freedom:

> As humans, we experience the ability to consciously choose our actions as well as the time at which we perform them. It has been postulated, however, that this subjective experience of freedom may be no more than an illusion and even our goals and motivations can operate outside of our consciousness (Bode *et al*., 2011, p. 1).

So, the *freedom that we experience*, according to Bode *et al*. (2011), is associated with the experience of being able to *consciously* decide on our actions and the time at which we act. The subjective experience of freedom would be an illusion if the experience did not correspond to us actually having this freedom.

The claim that the experience of freedom that we have when we *consciously* choose could be an illusion, followed by the claim that even our goals and motivations could operate outside of *consciousness*, shows that, in this conception, our freedom depends on our *consciously* choosing our actions. Therefore, the experience of freedom would be an illusion if deciding about our actions and their timing happened outside of consciousness.

To make sense of the statement that *our experience of freedom may be an illusion*, one is led to believe that Bode *et al*. (2011) mean that if we were free, then it would not be possible to decode the information about which button the subject was going to press before she was conscious of it. It would not be enough that the subject should become conscious of her decision after the information was already pre-existent unconsciously (about 7 seconds before consciousness of the decision).

So, Bode *et al*. (2011) are making a claim about our experience when they say that we freely—i.e. consciously—decide which actions to perform and at which

[20] According to Huo ***et al.*** (2014), there may be reasons for caution before ruling out any other activity relevant to the task that may have been occurring at the time. Huo et al. found evidence that some brain activities do not show a hemodynamic signal (the signal that shows that there has been use of blood oxygen in a certain area of the brain); therefore it is possible that other activities that are not picked up by fMRI could be happening alongside activities that do produce hemodynamic signals simultaneously during an fMRI experiment. Perhaps a pattern of activity that realizes the gradual buildup of the consciousness of the decision process would not produce a hemodynamic signal.

[21] Some may prefer the term Free Will to refer to human freedom of action.

moment. They claim that this experience is in fact an illusion, because the outcome of the decision is already predictable before the subjects were conscious of it, which is what they believe that their experiment shows.[22] Therefore, our experience of freedom would be an illusion, because we do not freely—consciously—decide on our actions or their timing.

There is, nonetheless, a second sense in which the term free, or freedom, refers to the conditions in which the experiment (Bode *et al*., 2011) was done and to the instructions about it. This must not be confused with the experience of freedom:

> […] only those subjects who inherently fulfilled important criteria were selected for the fMRI session. First, the frequency with which a subject chose each of the two possible outcomes (left button or right button) needed to be balanced, meaning that one option should not have been chosen more than twice as often as the other. Second, we selected subjects that ''naturally'' performed trials at a moderate pace (i.e., at a speed of 15 to 50 seconds per trial). […] These first two criteria were not known to the subjects such that they had maximal freedom in their decisions, but it was specifically emphasized that their decisions should be unbiased and spontaneous (Bode *et al*., 2011, p. 2).

In this sense, *a free decision* is one that actually does not have any constraint imposed on it by the experimental conditions or by the experiment instructions. There was no external restriction or direction about which button the subjects should press. There was no restraint on the balance of their decisions (how many right or left choices), nor on the time they had for each action. In this case, the decisions were considered free just in the sense that there was no external restraint to them. This lack of restraint does not depend on consciousness; it depends on the lack of restrictions or directions stipulated by the experiment's instructions: "Subjects were free to decide, at any time, to press the left or the right button with the corresponding index finger" (Bode *et al*., 2011, p. 2).

This is not the same as the *experience of freedom* that we have when we act. This is the freedom of having no external restriction. To avoid confusion with the first sense of the term freedom discussed above, I will call these *unrestrained decisions*, not free decisions.

To make clear the distinction we may imagine that a wrestler feels like she is free to act as she wishes, in the sense that there is no intrinsic impossibility to her movements entailed by her human condition, or, in the terms Bode *et al*. use, she feels that she *consciously chooses her actions*. The wrestler may decide which strategy to apply against her opponent; however, she may also find her movements *restrained* at a certain moment, because her opponent is pinning her down. Her opponent is imposing an external restriction on her actions at the moment in question.[23] In the sense of *freedom* applied in the experiment, though, we would certainly not say that the opponent has restricted the wrestler's freedom to choose her actions and their timing. She can still try to move, even if she fails to have the strength to get out of her opponent's grip.

[22] Miller and Schwarz (2014), however, have proposed that consciousness may not be all-or-nothing; it may be gradual. In this case, the strengthening of the pattern of activity could be related to the subjects' supposedly heightening degree of consciousness alongside the strengthening of the patterns of activity that produce the decision.

[23] Of course, this is a kind of restraint that is different from that of an instruction about what to do. The analogy being made is that the experiment instruction tries not to limit how the subjects of the experiment may move (which button to press) nor the moment that they may move. In this sense, it grants the kind of freedom to the subject that the wrestler is taking away from her opponent by pinning her down.

Keeping these distinctions in mind, it is possible to understand why the experimenters believe that our experience that we freely decide which actions to perform and at what moment we will perform them is an illusion. This is the case because they interpret the experiment as having revealed that unconscious processes already carry information about which button the subject will press—i.e., which action she will perform—before she is conscious of it. So the content of the decision is already settled before the decision is conscious.

"These findings support the conclusion that frontopolar cortex is part of a network of brain regions that shape conscious decisions long before they reach conscious awareness" (Bode *et al*., 2011, p. 12). This is considered evidence for the claim that our experience of freedom is an illusion because even in the case of unrestrained decisions, it is claimed that the subjects' decision about their action and the timing of their action was encoded unconsciously. Bode *et al*. present the experiment as evidence that we are not free to make these decisions, or at least that is what we are supposed to understand based on their results.

The problem with this interpretation of the results of the experiment is that it is stated as if a discovery about our freedom was made that would show that our *experience of freedom* is an illusion. However, if Bode *et al*. understand that consciousness is necessary for this kind of *freedom*, the experiment's instructions seem to make it impossible for this freedom to actually be investigated by it. The subjects were clearly instructed to not think about the decision they were supposed to make. They probably thought of something else during the experiment;[24] in this way they drove their conscious attention away from the task. This is a different procedure from the one in which we, for instance, reflectively decide to act, of which we are usually conscious.

So the experimenters have set the experiment up in such a way that consciousness does not interfere in their measurements, and then they conclude that the experiment showed that the subjects did not exercise their freedom in deciding, because the information about the decision could be decoded before the subjects were conscious of it. It seems like they designed the experiment in such a way that subjects would not consciously entertain the decision about their action. Although they ran an experiment on unrestrained decisions, it is a stretch to draw any conclusion about the experience of freedom, even under their own conception of it, and whether or not it is an illusion under their conception of freedom.

Had their experiment involved reflective decisions, then their conception of freedom could have been investigated by the experiment. However, this is not the case. Therefore, Bode *et al*. (2011) are not warranted in drawing conclusions about our freedom to decide on our actions, as they conceive it, nor about reflective decisions for that matter. They may draw conclusions about NUD, which are passively acquired.

Conclusions

It was argued above that Bode *et al*. (2011) conduct an experiment on NUD and that it offers interesting findings on those. Nonetheless, the conclusions they draw about reflective or active decisions based on their results are not warranted by the latter.

[24] In a questionnaire "most subjects reported that they did not have specific thoughts they could remember. Some reported having thought about (or mentally read) the letters, some reported having occasionally thought about daily activities but none reported having thought about the decisions" (Bode ***et al.***, 2011, p. 6).

The experiment's instructions do not allow the subjects to consciously entertain the decision about which button to press, because they were not supposed to think about the task that they were expected to perform. So it is hard to see how the information about which button to press could have originated consciously. Therefore, it is not possible to draw any conclusions about our experience of freedom according to the conception of this experience offered by Bode *et al*. (2011) themselves.

This shows that an experiment of this kind that involves subjective and objective data requires conceptual caution. The above discussion of the conceptual issues related to the study led to a different interpretation of the results. This may be a useful and important philosophical contribution to neuroscientific investigation, especially those investigations involving philosophical issues such as consciousness and human freedom.

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