

Can the Sense of Agency Be a Marker of Free Will?

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Abstract:

In this paper, I will analyse the relation between a sense of agency and free will. It is often proposed that by investigating the former, we can find a way of judging when an action is voluntary. Haggard seems to be one of the authors believing so. To answer if this assumption is correct, I will: 1) analyse the categories of free will and agency; 2) define the sense of agency; 3) describe ways of investigating the sense of agency; 4) describe models of emergence of the sense of agency; 5) analyse the relation between agency and responsibility. I will end by discussing the actual possibility of using the sense of agency measurements (as described in experimental sciences) as markers of free will.

Keywords: sense of agency, sense of ownership, free will, responsibility.

1. Introduction

The question of free will has fascinated humanity throughout its entire history. Minds of greatest philosophers were harnessed to answer this question, and still today this debate is far from being resolved. However, recent years have seen an emergence of research based in psychology, cognitive science, neuroscience, and experimental philosophy that tries to naturalise said problem and find measurable aspects of this phenomenon. In this paper, I will analyse the problem of a sense of agency from the perspective of free will investigations. In the context of free will, we can distinguish free will per se from our experience and a belief in free action. Agency itself is a complex phenomenon, it requires a similar distinction between actual agency and our belief or experience of being an agent in a certain action, thought, etc.

Usually, we take for granted that we possess a body and that we can act upon the world. Parallel to the sense of agency, we can describe a sense of ownership, that is a feeling of mineness that we perceive towards our body, feelings, and thoughts [16]. The sense of agency, on other hand, refers to the experience of initiating and controlling an action [31]. Both experiences seem to play an important role in our life [2]. However, in this paper, I will concentrate only on the sense of agency. As Patrick Haggard writes: “As noted above, a genuine sense of agency clearly requires some internal state of volition, conation, or ‘urge’” [18, p. 196].

How should we understand this ‘volition’, what is it in a metaphysical sense, and can it be found by research using “hard science”?

The choice to concentrate on the sense of agency was made, because the question I am trying to answer is: can the sense of agency be considered an actual marker of free will? The sense of agency, in opposition to free will per se, appears to be measurable and useful for sciences outside philosophy [34]. This category appears, among others, in neuropsychology [7], experimental psychology [42], and cognitive neuroscience [10]. In this work, I will analyse what exactly the sense of agency is in each of these situations and can it really let us measure actual free will.

2. Free Will and Agency

Let us start by analysing briefly what a belief in free will entails and how it connects to the sense of agency. Belief in free will is an abstract idea that people have the ability to act freely. Both by having knowledge of alternative options and by having the ability to choose any of the options without constraints [23], [24].

It appears that most cultures operate on the basis of some belief in free will [39], but, even if that is true, we accept that the degree to which we see ourselves and others as free vary [1]. Scientists performing research in domain of psychology attempt to create tools allowing for measurement of endorsement of the belief in free will. Tests like that usually emphasise different aspects of the philosophical definition of free will. One such test is called The Free Will Inventory [33]. It consists of 29 items divided into two parts. Part one consists of five items designed to measure the strength of a belief in concepts such as: free will, determinism, and duality. Part two consists of statements designed to explore interplay between the attitudes about free will, determinism, choice, the soul, predictability, responsibility, and punishment. In tests like this one, and generally in the experimental approach to free will, we can notice a strong belief in a link between the concepts of choice and free will [9]. I will return to this connection later in this work.

The prevalent belief in free will raises a fundamental question – Why would anyone endorse this idea? To answer this question, let us look at some theories of free will function. On the one side, free will can be seen as a mechanism allowing a person to pursue one's desires, goals, wants, and needs [20]. In that context, free will is only worth having if it allows an individual to follow self-enhancing activities – where self-enhancement is understood as achieving one's goals [8].

On the other side, we have a theoretical position that can be called “action-control perspective.” This theory presents free will as a means that evolved to allow the self to coexist with others in society by overriding the biological urge to focus only on personal needs [25]. Impression of free will could have possibly evolved to allow people to deal with a world of complex societal interactions requiring coordination, prospection, planning, and inhibition of self [26], [37].

The close relation between free will and a moral responsibility enforces the view that the concept of free will is strongly embedded in social consideration. This concept may be seen as an explanation to the predicament of associating determinism with inevitability, thus reducing accountability for actions. For instance, Kathleen Vohs and Jonathan Schooler [45] found that inducing a disbelief in free will – using a set of prepared statements about determinism – led to an increase in dishonest behaviour. Based on these observations, we can see the belief in free will as a social tool. After all, a belief that a person could have made a different choice is considered essential in most legal systems to attribute responsibility. Societies usually adjust legal and moral judgement based on the assessment of whether an action of a person was done out of his or her free will. In usual circumstances, that mean a person has to choose to perform a certain action by his or her own volition for that action to be considered a crime.

Simultaneously many, if not most, voluntary actions appear to be “phenomenally thin” [41]. That means we are not aware of most decision processes that lead to our actions. It seems like we perform many of our actions “automatically”, even if in reality some kind of mental process is preceding those actions. This “thinness” does not hinder our ability to produce feeling of control over what we are doing. However, this feeling can disappear in certain situations, lets considered Haggard's example:

(...) a simple example demonstrates the importance and careful construction of the sense of agency. When it gets dark, I may reach out to switch on the lights, perhaps barely aware that I am acting at all. However, if my hand fails to touch the switch, or if the light fails to come on, I will experience a striking conflict and violation of expectations as a result of mismatch between the intended and actual result of the action. In this scenario, the normal experience of fluently controlling the environment is suddenly interrupted as the sense of agency is lost [18, p. 197].

Based on that observation, Haggard argues that criminal and moral responsibility requires not only freedom of action, but in the first place, a sense of agency for a certain action [18, p. 197]. He states that the responsibility requires not only that the agent performs a certain action, but also that they know the nature and quality of said action. This, in his opinion, implies that the agent should experience a sense of agency towards this action.

3. What is the Sense of Agency?

Philosophical reflection upon the phenomenon of a sense of agency allows us to put forth some observations. To begin with, the sense of agency is a complex and non-homogenic structure. Many authors argued that several separate levels of this phenomenon can be distinguished [22], [15]. An influential conceptualisation comes from Matthis Synofzik et al. [40]. According to this theory, the sense of agency has to be described by a two-step account. First level of this phenomenon is the “feeling of agency,” it is pre-conceptual and pre-reflective, because of that, it operates on the very edge of consciousness. It may include the experience of intending an action, of choosing to perform this rather than other action, etc. These experiences are cognitive in nature and were linked to processes happening in primary motor cortex that is sending the motor command [36]. Second level is called the “judgment of agency,” it reflects a person’s judgement on being the author of an action. It hinges on motor information as well as post-hoc recreation of authorship [30]. This typically involves experiences that are associated with bodily movement and is relayed by peripheral somatosensory receptors. What is interesting, the involuntary movements tend to produce this kind of peripheral experience, but not this deeper experience of intent, because of that they are never accompanied by a sense of agency, although they are often accompanied by a sense of ownership.

Another issue is the distinction between the predictive and inferential aspect of the sense of agency. The question here is: what is more crucial for our sense of agency? The first option is, processes associated with action control and predicting possible sensory consequences of said actions – this is a predictive sense of agency [14]. The second option is, the interpretation of actions and experiences happening post factum – this is an inferential sense of agency [28], [47]. In this approach, the sense of agency does not preclude the action but is a consequence of it. Further in this work, I will assume that both aspects are equally necessary to understand the sense of agency, and none alone is enough to fully comprehend this phenomenon.

In philosophical literature, we can find propositions of several components of the sense of agency. We can start by asking if this phenomenon exist jointly with some other? We often find description of this experience as either an experience of being the source of decision or locus of control. This analysis would suggest that acting and controlling an action are intrinsically connected. We can distinguish at least two interpretations for both acting and controlling.

In the case of the former, we have to answer the question – what is this source we are talking about? We can call forth two theories, one authored by Athony J. Marcel [29], other by Nicolas Georgieff and Marc Jeannerod [17]. The first one is based on, the mentioned earlier distinction between a sense of agency and a sense of ownership. He states that in both cases, the sensation we experience is linked to some sense of ownership. In the case of agency, what we experience is an ownership of action. The source in that case is the ownership of action. The second theory is based on the idea of a so-called “who” system. In this theory, we begin with a completely anonymous actions, afterwards, we accredit those actions to us or other people. Then this “who”, identified as

an agent, becomes the source of action. By accrediting the source of action to ourselves, we constitute our sense of agency [6].

The control of actions can be similarly connected with a sense of agency by some mediating phenomena. It is possible that it is because we experience ourselves as controllers of actions, we have a category of agency. In this situation, the sense of agency can be linked to two different phenomena. In the first place, we can talk about a sense of control over our own body and its movement. It can be connected to control over sensory-motor signals, in that case, the experience of our body and thoughts as being controlled by us would be paramount for the sense of agency [27]. Other possibility is the sense of control over what is not our thoughts, that is we notice a control over aspects of external (physical or social) world. Good example is the experience of control over some machinery like driving a car. This feeling can function on a very primitive level, often pre-reflexive, but is fundamental for our experience of ourselves.

4. Investigating the Sense of Agency

Multiple approaches to studying the sense of agency exist. After James Moore's [30] distinction, we can divide them into two groups: either they use an implicit or explicit method of assessment. Below I will briefly describe both of those measurements.

Implicit measurement searches for behaviours or neuropsychological correlates of voluntary actions that can be assessed [30]. In this paradigm, the participants are not explicitly asked about their own experience of agency, instead how their experience looked like is inferred from some measured correlates. These correlates are treated like markers of the sense of agency. Usually, the implicit sense of agency measurement is based on the feeling of agency aspect of the phenomenon. The most widely used implicit sense of agency measurement appears to be the intentional binding [32]. The intentional binding effect is a subjective compression of perceived time between a voluntary action (e.g. voluntary pressing a button) and its external sensory effect (e.g. some kind of audio cue). A common result is that the time interval between the action and the effect is underestimated when this action was voluntary, but not when it is involuntary [19] or passively conducted [49]. These findings led Moore and Sukhvinder Obhi [32] to suggest that temporal binding results from an efferent-based prediction system that binds an intent of action with the predicted sensory outcome. With a rise in popularity, this view was challenged by some authors. One objection was that some researchers could not find a difference between self-generated and involuntary actions [35]. Moreover, some studies found temporal binding in a situation of absence of volition [3]. As a result, some authors [3] suggested that a casual inference, rather than an intentional one, leads to temporal binding.

Explicit measurement, in contrast to an implicit one, assesses aspects of the sense of agency directly [30]. To achieve this goal, questionnaires, where participants judge their contribution to a task or describe how intense the experience of agency was during the task, are used. Popular versions of the explicit sense of agency measurements are the "helping hands" experiment [48] and the "I spy" experiment [47]. Both of those experiments will be described below. Another way of explicitly measuring the sense of agency are experiment where participants are asked to perform a motor task which they cannot observe [30]. They are offered some feedback on a screen, but often the movement depicted is not their own. Instead, it is movement of an experimenter or a computer simulation. Basing on that information, the participants are asked to judge whose movement can be seen on the screen.

5. Models of the Emergence of the Sense of Agency

There are multiple models of how the sense of agency appears. In this paragraph, I will attempt to describe the most popular in literature. They will be presented in an order of understanding. That means that the theory that is built upon an earlier one will be presented later.

The first theory I will describe is the comparator model. First fashioned as a theory of motor control, it is used today by authors like Chris Frith [13] and Nicole David [5] to explain the sense of agency. This theory states that the brain has an internal prediction model, it includes an efference copy whenever a new motor command is produced. If this copy matches the sensory input, the movement is perceived as self-caused and a sense of agency is produced. In an opposite situation, efferent does not match reafferent, the sense of agency will not appear. The comparator model as a model of motor control is well supported by empirical data [5], [40]. Unfortunately, the relation between this model of motor control and mechanisms of how the sense of agency appears is not as clear [30]. One objection is that this model considers only sensorimotor cues neglecting any other that can possibly be relevant for the sense of agency [30], [40], [47]. Another critique is that there exists relevant clinical and experimental evidence of a sense of agency appearing in the absence of reafference, and without it, the comparator mechanism cannot be fulfilled. An example of clinical data, contradicting the comparator model, is the observation of phantom limb patients experiencing voluntary movement in their phantom limb [38]. An example of experimental data, contradicting the comparator model, is Daniel Wegner's "helping hand"-study [48]. In this study, the participants watched themselves in a mirror while another person stands behind them extending and moving his or her arms in such a way that in the mirror, the impression of the participant moving his or her arms is generated. It appears that if in this situation, the participants are verbally informed about the next action; they report a sense of agency arising for said movements [48].

The second theory I will consider is the theory of apparent mental causation [47]. This theory approaches the problem of the emergence of the sense of agency by rejecting a strong involvement of motor systems postulated by the comparator model. Instead, it proposes the sense of agency to be an effect of a purpose inference mechanism, that infers the casual relation for the observed action from the sensory input [32]. The proposed conditions for appearance of a sense of agency are: 1) an intention precedes an observed action; 2) the intention is compatible with this action; 3) the intention is the most likely the cause of this action [32], [47]. Empirical support for this theory comes from, the mentioned earlier "I spy"-experiment [47]. In this experiment, the participants work in a cooperation with the experimenter ally in jointly controlling a computer mouse cursor that can be moved onto a set of pictures displayed on the screen. Their task is to point to one of the pictures and then hold the cursor over this picture for around half a minute. After the task is performed, the participant indicates how big of an impact he or she had, in his or her subjective opinion, on completing the task. An interesting observation was that when the participant is primed with a chosen picture before the trial, he or she tends to attribute more of an impact to his or her actions. This situation is true even if the picture he or she was primed with, was chosen by the experimenter ally and not by him or her. This overestimation of self-agency led Wegner to postulate that the sense of agency is illusionary. He states that conscious willing of an action is not casually involved in performing said action [46].

The next theoretical position, in respect to emergence of sense of agency, is called the multifactorial weighting model. It is an attempt to reconcile the two previous theories. It is achieved by suggesting that the sense of agency is generated based on many different cues, which are weighted according to their reliability in a certain situation. In that way, this theory does not deny the comparator model involvement in creating a sense of agency, but it also allows other processes to play their part in the generation of this experience. Other cues are taken into consideration if, for example, an action does not allow for clear efferent-reafferent comparison. Going back to the feeling of agency and judgment of agency distinction, mentioned earlier in this work, it tends to happen more for the judgment of agency situations. That is the case because for the judgment of agency, social and environmental data provide more reliable indications than the efferent-reafferent comparison. Synofzik [40] provides an example of sitting alone in a room when an action happens. He states that we may be ready to ascribe this action to ourselves simply on the basis of believing that we were alone in this room.

Even if the multifactorial weighting model is correct, there still is a question of how the brain assigns the weights to different agency cues. The Bayesian cue integration theory [31] tries to

answer this question, and it is the last model of the appearance of a sense of agency I will describe. The background idea behind this theory is the assumption that the brain has access to many different information channels, each giving their own estimation about origins of the action. Those estimations are marked by a high uncertainty, because of that the brain cannot simply rely only on one cue but has to effectively combine all the information coming from different channels. To achieve that, as Moore and Fletcher suggests, the brain creates an estimate out of all agency cues, where importance of each cue is weighted according to every cue precision. The authors' suggestion is that the brain applies a maximum likelihood estimation to all agency cues thus giving an overall agency assessment. This assessment likelihood is much higher than assessment based on any single cue alone [31]. There is significant experimental evidence that the nervous system often integrates multisensory inputs in a maximum likelihood estimation manner [44]. Interestingly, this approach does not require any priori knowledge about which agency assessment is to be expected. However, such a priori knowledge can be added to the model as Bayesian priors [31]. We can notice three important advantages of the mentioned theory. First of all, it provides an effective model of how many agency cues can be integrated in one agency inference mechanism. Secondly, it can explain how the integration of agency cues coming from different modalities is possible. Thirdly, it can integrate the priori knowledge and beliefs into this inference mechanism. An unfortunate aspect of this model is that it cannot answer the question about how many possible cues there are [4].

6. Agency and Responsibility

Haggard adheres to idea that personal responsibility for actions is based in freedom of said actions, and this freedom is judged by the sense of agency. He summarises his views on responsibility in the following way:

This (personal responsibility) forms the basis for praise and blame, punishment and reward. Individual responsibility depends on the assumption that most, or all, individuals experience a sense of agency over their actions and outcomes. In fact, courtroom pleas of 'guilty' or 'not guilty' are explicit judgements of agency. Few mental states thus sustain such a strong social superstructure as the sense of agency. The 'voluntary act condition' in law insists that an individual can only be criminally responsible for actions that they consciously decided to perform with a reasonable understanding of the likely outcome [18, p. 205].

Examining the problem of responsibility, Polish philosopher Roman Ingarden wrote: "Perpetrator is responsible for an act performed by himself, and its outcomes, if and only if it is his own act" [21, pp. 82-83].

The author follows with observation that, in the first place, we have to answer the question: What does it mean that an act is an own act of someone [21]? He concludes that there are two conditions: 1) the agent has to be conscious and understand his or her actions; 2) the agent has to be able to choose to act. We will not follow the first condition, but we will analyse the second one. Ingarden noticed that the second condition is directly linked to the controversy of determinism-indeterminism. It is like that because, as he states after Nicolai Hartman, free will decision is usually understood as causeless. Often, it is believed that free will cannot be reconciled with the pervasive determinism prevailing in the world. However, after Hartman, he concludes that the lack of cause cannot be a criterion for free action. Causeless action would not be motivated, ergo could not be an action the agent consciously decided to perform. He proposes that free action must mean an action that the cause of has a source only in the agent. That situation happens in two instances: 1) the agent accepts what is necessary, because he or she understands the inevitability of it; 2) the decision comes directly from within the agent without any external impetus. It is very well possible

that, in the deterministic material world (and that is the world presented in “hard sciences”), the second criterion cannot be fulfilled, but the first one remains a possibility.

There remains the question of the possibility of free choice in a situation of a lack of alternatives. Can we reasonably assume that the source of action was within us in a situation when we did not have the freedom to do otherwise? The most prominent strategy for defending possibility of this situation comes from Harry Frankfurt [12]. He presented a series of thought experiments intended to show that it is possible for agents to be morally responsible for their actions and yet lack the ability to do otherwise.

Let us consider a Frankfurt-style argument presented by John M. Fischer:

Imagine, if you will, that Black is a quite nifty (and even generally nice) neurosurgeon. But in performing an operation on Jones to remove a brain tumor, Black inserts a mechanism into Jones’s brain which enables Black to monitor and control Jones’s activities. Jones, meanwhile, knows nothing of this. Black exercises this control through a sophisticated computer which he has programmed so that, among other things, it monitors Jones’s voting behavior. If Jones were to show any inclination to vote for Bush, then the computer, through the mechanism in Jones’s brain, intervenes to ensure that he actually decides to vote for Clinton and does so vote. But if Jones decides on his own to vote for Clinton, the computer does nothing but continue to monitor – without affecting – the goings-on in Jones’s head [11, p. 38].

Fischer goes on to argue that a personal responsibility is not based on the possibility to choose otherwise. If Jones chooses Clinton on his own, Fischer argues, it is his own free action – even if other possibility was never attainable. What matters for the agent’s freedom and moral responsibility is not what might have happened, but how his or her action was actually brought about. Unfortunately, the sense of agency is unable to answer this question. Research on this phenomenon concentrates on how a person decides what the source of the action is. It is not designed to answer how the action was brought about. Because of that, it cannot be used as an actual marker of free will. We can see that in the descriptions of the experimental measurements of the sense of agency. Even the most sophisticated of them, The Bayesian cue integration theory, only answers on what basis we believe that someone was an agent.

7. Conclusions

Research into the sense of agency has an undeniable significance. Moore mentions multiple areas of investigation that can benefit from examining this phenomenon [30]. The mentioned spheres are health and well-being (e.g. research into schizophrenia), human-computer-interaction, issues of free will and responsibility. As much as an importance of this research cannot be denied for first two areas of investigation, Moore himself diagnoses the problem of the research into the third area. He writes:

Free will is the elephant in the room when it comes to sense of agency research. Researchers tend to sidestep the issue of free will and instead focus solely on uncovering things like the neurocognitive basis of agentic experience. That is, whether or not we have free will, we unquestionably *do* have the experience of agency when we make actions and scientific research has tended to focus on understanding this experience. This evasion of the free will debate is understandable; philosophical debates on free will are often quite complex and confusing, especially for scientists with no background in philosophy. However, I think those of us working on this topic should try to engage more with this debate. In terms of impact, the social and legal consequences of this debate are immense, and our findings should be helping to inform this debate [30].

In this work, the relation between a sense of agency and free will was examined. It is often believed that investigating the former can allow us to find a way of judging when an action is voluntary. An example of a researcher subscribing to this idea is, among others, Haggard. I started by reconstructing why some researchers believe free will requires a sense of agency. Next a description of this phenomenon was provided. Then I described the methodology behind investigating the sense of agency, to follow that with a presentation of the most popular models of emergence of this phenomenon. Finally, I analysed the relation between the responsibility and agency. In conclusion, the sense of agency, in my opinion, fails to fulfil hopes placed in it. It only answers the question of how we ascribe responsibility and not who actually is responsible. After all, as Ingarden noted [21], being held accountable is not the same as actually being accountable.

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