JNphi

Do We Have Free Will, or Is Everything Predetermined? A Neuroethics Dilemma

João Guerreiro

Abstract

The debate over free will and determinism remains one of the most profound philosophical and scientific dilemmas, raising questions regarding human agency, morality, and responsibility. Determinism posits that all actions are dictated by prior causes and natural laws, leaving no room for genuine choice. In contrast, libertarianism argues that humans possess free will, enabling them to act independently of deterministic constraints. Neuroscientific studies, such as Benjamin Libet's experiments on readiness potential and fMRI research predicting motor intentions, seem to support determinism by suggesting that unconscious brain activity precedes conscious decision-making. However, critics argue that these studies oversimplify free will by focusing on basic motor actions rather than complex cognitive processes. Furthermore, research on intentional inhibition and the ability to consciously override pre-programmed actions challenges deterministic interpretations, suggesting a role for conscious agency. While neuroscience provides valuable insights, the complexity of human thought extends beyond simple movement-based experiments. This paper explores the intersection of philosophy and neuroscience, emphasizing the need for a more nuanced understanding of free will that accounts for higher-order reasoning and moral decision-making.

Key Words: Free Will, Determinism, Libertarianism, Neuroethics, Philosophy of Mind, Cognitive Neuroscience, Moral Responsibility, Readiness Potential, Intentional Inhibition.

DOI: 10.5281/zenodo.17292163

Introduction

Are our choices products of unbridled freedom, or do forces beyond our control dictate them? This question is at the heart of philosophy's most debated topics. For centuries, the question between free will and determinism has captured thinkers, theologians, and scientists alike, challenging our understanding of human agency, morality, and

Corresponding author: João Guerreiro
Address: LASIGE, Informática, Faculdade de Ciências, Universidade de Lisboa
e-mail ✉ guerreiroj@edu.ulisboa.pt

responsibility, where the two opposing philosophical branches at the heart of the debate are libertarianism and determinism.

Determinism contends that every action, thought, and decision throughout the universe is the inevitable consequence of preceding events governed by the immutable laws of causation. This perspective holds that the state of the universe at any given moment dictates the state of the universe at the next, much like a domino effect where every event is a continuation of what came before. If determinism is correct, the notion of free will is nothing more than an illusion, a comforting narrative we construct to mask our subservience to fate. This deterministic view is grounded in the belief that natural laws, whether described by physics, biology, or chemistry, leave no room for genuine freedom, from the firing of neurons in the brain to the movement of celestial bodies, every event unfolds according to strict, unbreakable rules. Consequently, our decisions and behaviors are seen not as independent or self-originated but as products of genetic, environmental, and psychological factors beyond our control (Fig. 1) (Baumeister et al., 2022).

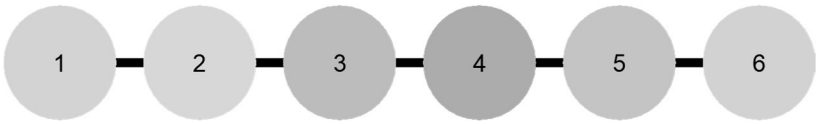

Figure 1. Illustration of deterministic ideology, where each event is governed by the prior.

On the other end of the spectrum is Libertarianism, the idea that humans possess genuine free will, unshackled by the deterministic laws of nature. According to this view, individuals are agents of their destiny, capable of making choices independent of prior causes (Kane, 1996). Libertarianism rejects the deterministic claim that every event is causally necessitated by preceding conditions, proposing instead that humans can act as true originators of their decisions, with the principle of alternate possibilities, where one could act differently in each situation, emphasizes human agency, creativity, and responsibility, often linking these traits to moral accountability (Fig. 2). For example, if someone could not have chosen otherwise due to deterministic constraints, it becomes difficult to justify holding them morally responsible for their actions. Libertarians argue that true moral responsibility requires the genuine freedom to act differently under identical circumstances (O'Connor et al., 2022).

From this perspective, it is possible to derive a series of foundational premises underlying each ideological framework. These premises serve as the core assumptions that define the conceptual boundaries of the

debate, offering a basis for understanding and critiquing the claims made by each philosophical stance:

1. Free will requires that necessarily, at least in relevant situations, agents have alternative possibilities and can do otherwise.

2. Determinism implies that necessarily, in any situation, there are no alternative possibilities, and nobody can do otherwise.

3. Free will and determinism are incompatible.

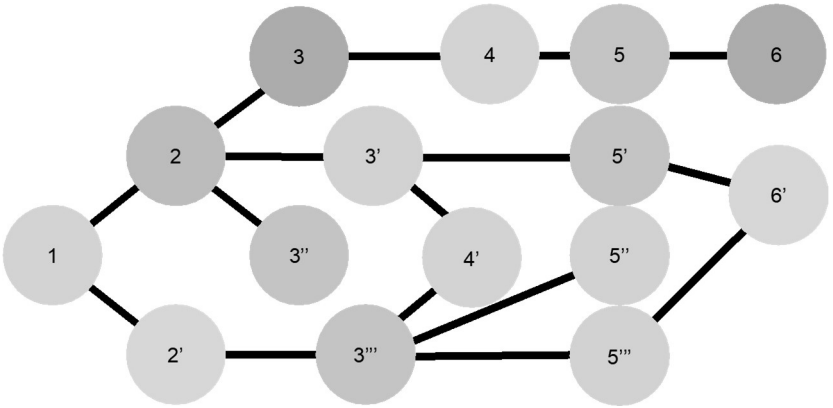

Figure 2. Libertarianism ideology, where there is more than one possibility.

Neuroscience of free will

To assess free will, one of the most famous studies on this topic is the one described by Benjamin Libet, who examined the relationship between conscious decision-making and brain activity. Libet's experiments involved participants flexing their wrists while reporting the precise moment they decided to move. Brain activity was recorded during the process (Lavazza, 2016). Libet focused on a specific brain signal called the readiness potential (RP), a buildup of electrical activity in the brain that is linked with voluntary movements (Schurger et al., 2021). His findings showed that readiness potentials began 350 milliseconds before the urge to move (Fig. 3), which may indicate that if decisions are initiated unconsciously, it seems conscious choice shaping our actions is limited or illusionary.

With this, recently, using Functional Magnetic Resonance Imaging (fMRI), researchers demonstrated predicting a person's intent to move by seeing activity patterns from frontal-parietal regions, such as the premotor cortex and posterior parietal cortex, even before that person wished for that movement, corroborating with determinism's ideology (Ruiz et al., 2024).

However, after careful consideration, it is important to note even though both scientific findings support determinism, they are flawed (Neafsey, 2021) by the problematic of defining free will by a specific set situation of simple movement. Defining free will as a simple set of physical movements is conceptually wrong, and it does not grasp human's full intellectual capabilities.

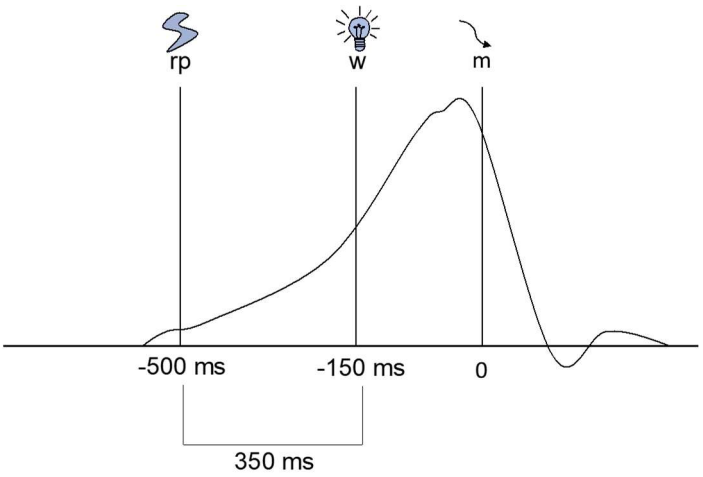

Figure 3. Schematic Diagram of sequence of events, cerebral readiness potential (RP), and wish to move (W) that precede a self-initiated voluntary movement (m). Relative to "0" time (muscle activation), cerebral RP begins first at -500 ms, and awareness of the wish to move (W) appears at about -150 ms.

On libertarianism ideology, Velmans argues that Libet's veto could still be a free choice even if the motion of the agent was initiated unconsciously in the brain and just became conscious (Reimer, 2022). Velmans advocates for a perspective where the agent is inherently embodied within the processes of their brain, suggesting that it is irrelevant whether a choice originates from unconscious neural processes or conscious deliberation. In this view, the agent and their body are fundamentally the same. Libet, however, disregards this interpretation (Reimer, 2022), as he suggests that the brain and the agent are treated as two distinct and independent systems, each with its separate processes. In this context, the agent is relegated to the role of an observer, passively witnessing the neural activities of the brain without directly influencing them (Reimer, 2022).

The Velmans' perspective also supports the critical finding on intentional inhibition, where the ability to consciously suppress actions before they are executed is due to neuronal activity in the frontal-median cortex, a region known as the center of self-control (Seitz, Franz and Azari, 2009) when participants deliberately decided to not perform a pre-planned action (Brass and Haggard, 2007). This "veto power" or the capacity for intentional inhibition, challenges deterministic interpretations by showing that individuals can override autonomic impulses or preprogrammed motor actions, reflecting a

conscious and power over actions (Brass and Haggard, 2007). Thus, while unconscious processes may initiate certain responses, the conscious mind retains the ultimate authority to intervene, reinforcing the idea of free will and human agency (Brass and Haggard, 2007).

Conclusion

The debate over free will versus determinism remains one of the most profound and complex philosophical and scientific questions. Determinism, supported by findings in neuroscience like Libet's experiments and fMRI studies, presents a compelling argument that our actions are governed by unconscious neural processes, leaving little room for conscious agency. These findings challenge traditional notions of autonomy, suggesting that much of what we consider voluntary may be predetermined, this would challenge the foundational concepts such as moral responsibility and justice, pushing society to rethink systems of accountability and punishment. Such implications extend the debate beyond abstract philosophy into the practical realms of ethics, science, and law. However, defining free will solely through basic physical actions, such as wrist movements, fails to account for the depth of human cognition, moral reasoning, and abstract decision-making. True human agency involves more than reflexive motor activity, as it includes the ability to deliberate, weigh moral consequences, and reflect on future possibilities.

Philosophically, libertarianism offers an alternative framework by emphasizing human creativity, agency, and moral accountability, suggesting that individuals are more than passive participants in a deterministic universe, such as Velmans' perspective. This, together with intentional inhibition builds a solid foundation that supports that voluntary actions power all movements, a window for future interpretations of what free will is in a complex framework such as the brain.

Ultimately, the intersection of neuroscience and philosophy highlights the complexity of free will, urging caution against oversimplified interpretations of scientific findings. To truly understand human agency, we must expand the scope of inquiry beyond simple motor tasks to include the rich, multifaceted nature of human thought and decision-making. The question of free will remains open, inviting continued exploration across disciplines, as it touches on fundamental aspects of what it means to be human.

References

Baumeister RF, Clark CJ, Lau S. Determinism. In: The Palgrave Encyclopedia of Possibility. 2022. https://www.researchgate.net/publication/352661459_Determinism. Accessed October 1, 2025.

Brass M, Haggard P. To do or not to do: The neural signature of self-control. J Neurosci. 2007;27(34):9141-9145. doi:10.1523/JNEUROSCI.0924-07.2007

Kane R. The Significance of Free Will. Oxford University Press USA; 1996.

Lavazza A. Free will and neuroscience: From explaining freedom away to new perspectives. Front Hum Neurosci. 2016;10:262. doi:10.3389/fnhum.2016.00262

Neafsey EJ. Conscious intention and human action: Review of the rise and fall of the readiness potential and Libet's clock. Conscious Cogn. Academic Press Inc.; 2021. doi:10.1016/j.concog.2021.103171

O'Connor TCF. Free will. In: The Stanford Encyclopedia of Philosophy (Winter 2022 Edition). 2022. https://plato.stanford.edu/entries/freewill/?utm_source=chatgpt.com. Accessed October 1, 2025.

Reimer R. What does it mean to inhibit an action?: A critical discussion of Benjamin Libet's veto in a recent study. In: Lect Notes Comput Sci. Springer; 2022:5-14. doi:10.1007/978-3-031-12429-7_1

Ruiz S, Lee S, Dalboni da Rocha JL, et al. Motor intentions decoded from fMRI signals. Brain Sci. 2024;14(7). doi:10.3390/brainsci14070643

Schurger A, Hu PB, Pak J, Roskies AL. What is the readiness potential? Trends Cogn Sci. 2021;25(7):558-570. doi:10.1016/j.tics.2021.04.001

Seitz RJ, Franz M, Azari NP. Value judgments and self-control of action: The role of the medial frontal cortex. Brain Res Rev. 2009;61(2):368-378. doi:10.1016/j.brainresrev.2009.02.003