

# A rigorous non-existence proof of free will in an indeterministic universe

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## Abstract

The article gives a rigorous non-existence proof of free will in an indeterministic universe.

**Keywords :** Free Will, Causality

## Introduction

Free will is believed to be the ability to choose between different possible courses of action unimpeded(Hegeler, 1910).

The sociological role free will plays has significantly obscured the nature of it.

Since the subject must have a physical definition before we start any discussion about it, we'll stick to the following definition of free will in the article.

## Definition of free will in the article

As far as the article is concerned, free will is the ability that is possessed and has been used by an entity to non-randomly choose one from multiple different physical possibilities in an indeterministic universe.

## Incompatibility between free will and determinism

Causal determinism indicates that there couldn't be more than one physical possibility at any given time and therefore contradicts the definition of free will.

Alternative definitions of free will have been suggested for reconciliation, giving rise to the belief that some forms of "free will" are compatible with determinism(Coates et al., 2015). Since these compatibilist alternatives are merely counterfactual and do not fit the aforementioned definition, discussion of them is outside the purview of the article.

## The proof's independence of the principle of locality

An important assumption in most fields of modern physics is the principle of locality, where it is believed to be essential to causality that effects do not propagate faster than the speed of light. Physical phenomena such as quantum entanglement demonstrate properties that some argue may violate this principle(Bell, 2015).

The proof given by the article doesn't rely on this principle, i.e. the rigor of the proof is independent of the validity of this principle, or lack thereof.

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## The three statements

If free will exists in an indeterministic universe, all of the following three statements are valid and non-contradictory.

1. *There is at least one entity with free will in the universe. Let  $F$  be an entity with free will in the universe.*
2. *As per the definition of free will,  $F$  has made at least one non-random choice.*
3. *Let  $t_c$  be the time when  $F$  non-randomly chose one from multiple different physical possibilities. Let the possibility chosen be  $p_c$ .*

## The contradiction

At  $t_c$ , the universe either contained or did not contain the information that  $p_c$  was chosen.

1. *At  $t_c$ , if the universe did not contain the information that  $p_c$  was chosen,  $F$  as defined is an entity in the universe and therefore did not contain the information that  $p_c$  was chosen. Therefore, the choice at  $t_c$  was not non-randomly made, which contradicts the statement "Let  $t_c$  be the time when  $F$  non-randomly chose one from multiple different physical possibilities."*
2. *At  $t_c$ , if the universe contained the information that  $p_c$  was chosen, there wouldn't be other different physical possibilities than  $p_c$ , which again contradicts the statement "Let  $t_c$  be the time when  $F$  non-randomly chose one from multiple different physical possibilities."*

Due to the contradiction, the aforementioned three statements could not be all valid and non-contradictory, therefore free will doesn't exist in an indeterministic universe.

## References

Hegeler EC (1910) The Monist, Vol. 20. Open Court. p. 369.

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Bell, J. S. (1987). Speakable and Unspeakable in Quantum Mechanics