Freedom to do Otherwise and the Contingency of the Laws of Nature

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ARTICLE HISTORY
Compiled November 17, 2021

ABSTRACT
This article argues that the freedom of voluntary action can be grounded in the contingency of the laws of nature. That is, the possibility of doing otherwise is equivalent to the possibility of the laws being otherwise. This equivalence can be understood in terms of an agent drawing a boundary between self and not-self in the domains of both matter and laws, defining the extent of the body and of voluntary behaviour. In particular, the article proposes that we can think of 'will' as naming the component of the laws of nature delimited by this boundary.

KEYWORDS
free will; determinism; compatibilism; freedom to do otherwise; laws of nature;

1. Introduction

The claim 'I could have done otherwise' is closely connected for most people to their idea of themselves as autonomous agents. In contrast, the recognition that the behaviour of the matter composing our bodies is governed by entirely deterministic laws tends to lead to scepticism about the reality of this freedom. In this article, I will explore what it would mean to take 'I could have done otherwise' as part of the definition of the term 'I' and look for an acceptable referent within a deterministic world. In particular, I will suggest that the boundary of that 'I' may not wholly be material but could instead lie partially in the realm of the natural laws.

I will argue that we can usefully think of the term 'free will' as naming some component of the laws of nature. That is, I propose that we can think of agents - such as ourselves - as being composed not merely of matter but as also including some elements of the laws that animate that matter. I will argue that, when we assume the laws of nature are contingent, this perspective permits us to consider such an agent as having the freedom to do otherwise, even when those laws are taken to be fully deterministic.

Before laying out this argument in detail more fully, providing some connection to the wider philosophical context may help to clarify and motivate the claims made above. The first point of comparison is to the proposal of Schopenhauer (1839) that what we know from without as the forces of nature is the same thing that we know from within as the will. In fact, these two positions become almost identical if we assume that 'forces' is referring to the generic drivers of physical motion, i.e. the

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laws of nature, rather than to, say, a product of mass × acceleration. However, while Schopenhauer conceives of freedom as purely transcendental, the position taken here is more mundane: that our freedom is essentially the same thing as the contingency of the laws of nature.

A second comparison is to the proposal of Chisholm (1964) to distinguish between two forms of causation, transeunt and immanent, with the former corresponding to the familiar deterministic causation between physical events, and the latter being a hypothesised agent causation, originating outside the chain of transeunt causes and effects. Typically, such a libertarian proposal for an agent to act as prime mover unmoved is taken as requiring that the laws of nature are in some way incomplete, with free will acting in the resulting gap. However, if we accept the laws of nature are real entities which govern the relationships between causes and effects, then we already have two relations - causation between successive events and governance of the laws over those events - which fit the essential structure Chisholm desires. Thus, I propose to identify this governance with the relation between an agent's will and their actions, rather than introduce a superfluous additional form of agent causation. In particular, the laws of nature are not themselves caused by prior events, having instead a status closer to prime mover unmoved, and so provide a promising locus in which to seek a referent for our concept of the will.

2. Free Will

Organisms are to some extent self defining in a way that other entities are not. For example, many post-imperial countries are defined by boundaries that were imposed onto maps by distant bureaucrats without due regard to the cultural and historical realities of people living in those regions. In contrast, the boundaries of an organism are defined, to a great extent, by its own biology and behaviour. In fact, part of what defines life is the constant struggle to maintain the boundary between self and non-self. This is true both at the microscopic level of immunological defense against pathogens and parasites, and also at the macroscopic level of the identification of predator and prey, nutrient and toxin.

For complex organisms with advanced brain functions, such as ourselves, this process of self definition takes on additional subtleties. In giving an account of who we are, we might make reference to fairly abstract concepts such as economic roles, social relations and national allegiances. One key element commonly shared across such identities is the idea of ourselves as autonomous agents. Pre-school children, for example, already differentiate between behaviour that is governed by an agent's volition versus behaviour that is determined by external constraints on the agent (Gopnik and Kushnir 2015).

Thus, we see at least some of our behaviour as arising from voluntary choices. In fact, many people believe that they make such choices freely, in the sense of multiple alternatives being possible and the final outcome being determined by the agent themselves. In contrast, others assert that the determinism of the laws of nature implies that only one outcome was ever possible and that the ability to do otherwise is at best a useful fiction.

This apparent tension has generated a great deal of thought and discussion across a wide variety of approaches towards a resolution, with compatibilism and libertarianism being two broad churches within this dialogue. While the compatibilist typically seeks to find a way of talking about freedom that is consistent with an agent being entirely

governed by deterministic laws of nature, the libertarian generally wants to reject determinism to create space for a more expansive conception of freedom. Freedom to do otherwise is a critical point of contention within this debate, with some authors insisting that a free act is one which could have been otherwise, even given identical conditions, and others rejecting this position as inconsistent with determinism and even incoherent in itself. Thus, freedom to do otherwise is typically associated for the compatibilist with doing otherwise under different physical conditions. That is, if wants, desires and urges are identified with physical states of the brain then the claim that you could have done otherwise, had you wanted to, is entirely consistent with determinism. A critical response would be to point out that under determinism these physical states of the brain are themselves determined by the laws of nature and therefore could not be otherwise. In other words, this concept of freedom may be largely irrelevant as I could not want other than what I did. Moreover, the question is not whether some other agent whose particular history and influences has produced a different set of desires and urges would have acted differently, but whether I could have done otherwise in that specific situation.

However, at least something has to be different to produce a different outcome, namely the willing itself, whatever it is. That is, 'I could have done otherwise' is a claim about the effectiveness of will in bringing about the actual outcome, with different acts of will bringing about different outcomes. Thus, the relevant question is whether other alternatives were possible given identical conditions before the will is exercised. If the will itself is determined by these prior conditions, then it seems only one future was ever really possible.

One option is to deny that nature is fully deterministic. If there are circumstances in which the laws do not prescribe a single future then agents may genuinely have multiple alternatives open to them. In other words, freedom to do otherwise can exist in the gaps where the laws of nature underspecify the future. A common objection to this line of reasoning is that genuinely undetermined actions would typically look like random jerks or flailings. Genuine autonomy appears to require that our actions are rational responses to our environment, rather than being entirely independent from it. We have evolved as humans to reason about the world around us, and those cognitive processes rely on consistent regularities within the behaviour of brain tissues.

Thus, our voluntary behaviour is a reaction to the circumstances we find ourselves in, rather than being something independent of them. Nonetheless, we see ourselves as being in control of this reaction rather than it being determined by external entities or constraints. Yet, we can also conceive of the processes underlying that reaction as being governed by deterministic laws. The following points, then, summarise the picture emerging from this discussion.

- I freely determine my actions in response to my environment.
- I determine that action B is to be my response to circumstance A, i.e. I will that A is to be followed by B.
- My will determines that B happens, in the sense that I make it necessary that B follows A.
- This willing is free, in the sense that without my determining influence, multiple other outcomes are possible. To be more precise, if my will is removed from consideration, then B is not an inevitable consequence of A.
- In addition, we would like to assign a referent to this 'will' within a world which is fully deterministic.

Let us clarify this situation by introducing some notation. In situation A, I deliberate on my options and choose to do B. I ascribe the manifestation of the outcome B to my having willed it. Let us denote this will by W_{AB}, and signify this sequence in the form $A \xrightarrow{W_{AB}} B$. When we say we are free to do otherwise we don't mean that C, D or E could happen when we will B. We mean that B happens because we will it, but we could also have willed C, D or E. In other words, we mean $A \xrightarrow{W_{AC}} C$ is also possible.

Let us clarify what these symbols mean further. A is some specification of the state of the world, including my body, to which I am reacting. As such, it is not a fully detailed state, but includes only the information available to me. It does not, for example, specify the state of distant astronomical objects that I cannot observe, nor does it specify the exact positions and velocities of the atoms and molecules constituting my body or the objects I do observe. Instead, it is a coarse grained specification of some limited parts of the world, such as 'I am hungry, that apple looks tasty'. One way to think of such a coarse grained state is as a set of fully detailed states: e.g. $A = \{a_1, a_2, a_3, \ldots\}$. Similarly, B is a coarse grained specification of the outcome I will, such as initiating a movement to reach towards the tree, and then pick the apple and eat it.

3. The Laws of Nature

That natural events can often be understood in terms of regular causal processes is part of the shared foundations of human cognition. From a young age, we understand that kicking the ball will cause it to roll, or squeezing the toy will make it squeek. It is also fairly common, across cultures, to posit unseen entities or principles to explain less obviously predictable behaviours. Ptolemy, for example, argued that the motions of the planets were sustained by souls. Taking a broader view, some scholastic theologians saw the reflection of a divine creators rational will throughout nature. In our secular age, Scientists instead seek to explain observable structure in terms of laws of nature.

For the last few hundred years, the scientific method has been incredibly successful in describing these lawful regularities. To a great extent, this success is grounded in a skepticism about the effectiveness of unaided reason in uncovering nature's secrets, and the development of empirical practices to augment it. In other words, the laws that we seek cannot be uniquely deduced starting from first principles, but we must instead use controlled experiments to whittle away the space of hypotheses.

It is therefore generally the case that our best descriptions of nature are provisional, awaiting falsification in some future experiment. In fact, it is not unusual to have mutually inconsistent scientific laws, as we do now. Nonetheless, we will assume that, over and above the laws known to science, there are underlying laws of nature which govern the causal regularities we observe.

For the purposes of this article I will assume that corresponding to our idea of the laws of nature there are real, contingent entities that govern the behaviour of matter deterministically.

- By real, I mean that invoking a law, such as conservation of momentum, to explain an observed event is not just a useful manner of speaking. I assume that the laws are entities we can talk about and use to explain the behaviour of matter.
- By contingent, I mean that hypotheticals such as 'if the speed of light was much smaller' are meaningful and refer to genuine possibilities. I assume that the laws

could be different from those we experience in our world.

- By govern, I mean that the laws are responsible for the regularities we observe in the material world. I assume that other laws would produce other behaviours.
- By deterministic, I mean that the laws are complete in the sense that they determine one specific future for each initial state. I assume that the laws select one specific possibility to actualise from among the set of potential alternatives.

The conception of laws as real entities that govern the behaviour of matter has been argued for by Maudlin (2007), but is not widely endorsed. Instead, their conception as true propositions, necessary or otherwise, is more frequently supported. Here, I will not spend a great deal of space re-iterating the arguments for and against these positions, but rather show that determinism and the freedom to do otherwise can be reconciled under the appropriate conception of the laws of nature. Thus, we will follow standard scientific discourse in taking our best empirical evidence as reason to believe that the behaviour of matter is governed by abtract laws that produce the observed regularities of nature.

Similarly, we will also follow scientific discourse in thinking of these laws as contingent. Sidelle (2002), for example, presents arguments against the philosophical position that laws are necessary a posteriori truths. Instead, he endorses what he sees as a traditional view that their empirical origin and conceivable falsity are sufficient grounds to consider them contingent.

In this article, 'laws of nature' refers, then, to contingent entities that govern the physical behaviour of matter. This relationship of governance, between the laws and the behaviour of matter, needs to be distinguished from the relationship of causation, between subsequent states of matter. Roughly, if the evolution of ψ_1 into ψ_2 is governed by a law L, then we say ψ_1 causes ψ_2. Clearly, these causal relationships form a transitive chain stretching back into the distant past and forward into the future, while governance is a connection only between laws and physical events. Although the events they govern have spatial and temporal locations, the laws themselves are not located within the structure of spacetime, and predicates such as before, above or begin cannot be meaningfully applied to them.

It is also worth noting that we commonly speak of laws in the plural. That is, we think of events as being governed jointly by a set of laws that together determine future events completely. Individually, a single law, such as conservation of momentum, may rule out many possibilities while leaving many other details unspecified. However, as stated above, I assume that there is a complete set of laws whose union is fully deterministic. There may also be multiple ways of decomposing this whole into component parts. That is, different formulations of the same overall deterministic processes may result in distinct but equivalent sets of laws.

Each component law will determine some aspects of the evolution of those processes but not others. That is, an individual law can be thought of as selecting some subset of outcomes among all possibilities, and the complete set of laws together specify a single determinate future.

Thus, these laws of nature, L, deterministically govern the evolution of the physical state ψ_1 into the physical state ψ_2, which we will write as $\psi_1 \xrightarrow{L} \psi_2$. However, we will typically not know or even be interested in a full specification of the state of the physical world and will instead work with some representation of the state, Φ, which captures only the relevant aspects, and ignores other aspects, Θ, such as the positions of distant stars or the subatomic details of a measuring instrument. In this case, the full state has then been decomposed $\psi = \Phi \otimes \Theta$ and the laws may also be

decomposable into corresponding parts $L = L_\Phi \otimes L_\Theta$. So, if we wish to study only Newtonian mechanics, we might set up our apparatus such that Φ is defined by the positions, velocities and masses of various objects, and L_Φ corresponds approximately to Newton's laws of motion and gravitation as it applies to them. L_Θ, in contrast, governs all the other aspects of the universe, including the electromagnetic interactions maintaining the objects internal structure and the nuclear forces driving distant stars. Under the right conditions, where Φ and Θ are very weakly coupled, i.e. the experiment has been isolated from other influences, we can ignore Θ along with the laws L_Θ, and focus only the evolution of the two particles: $\Phi_1 \xrightarrow{L_\Phi} \Phi_2$.

In this way, a single Φ corresponds to a diverse set of fine-grained states $\{\phi_1, \phi_2, \phi_3, \ldots\}$, all having the same positions, velocities and masses for the experimental system, but varying in their other details, which are specified in Θ. Similarly, the law L_Φ no longer determines uniquely the evolution of an individual ϕ_i, but instead operates at the coarse-grained level of the sets corresponding to Φ.

The decomposition of laws into sub-components allows us to consider alternatives in which we vary a specific element of the laws, while leaving other elements unchanged. So, for example, we could consider what happens if we replace L_Φ with a version, $\hat{L_\Phi}$, in which the gravitational constant has been increased. Such counterfactuals are not only useful in understanding the operations of the known laws but also in designing experiments that probe what is not yet known. A well designed experiment isolates out a phenomenon of interest and enables the elimination of the alternatives that fail to agree with the observed results.

More generally, whenever an α is the cause of a subsequent β, we can, in principle, think of this sequence as being governed by a component of the laws, $L_{\alpha\beta}$, which is specific to that causal interaction. That is, we can think of the laws as decomposing into a part that governs only the sequence $\alpha \rightarrow \beta$ and a part that governs everything else: $L = L_{\alpha\beta} \otimes L_\Theta$.

4. Free Will as the Laws of Nature

Consider an act of will, $A \xrightarrow{W_{AB}} B$, in which an agent in situation A expresses the behaviour B as a result of his will W_{AB}. Further, consider the case in which A causes B under deterministic laws L: $A \xrightarrow{L} B$. More precisely, we can decompose these full laws, L, into a component that pertains purely to these events, L_{AB}, and a remainder, L_R, with $L = L_{AB} \otimes L_R$. This leaves us with two perspectives on thinking about why B follows A. One is in terms of an act of will, $A \xrightarrow{W_{AB}} B$, and the other is in terms of causal laws, $A \xrightarrow{L_{AB}} B$.

The proposal being made in this paper is that W_{AB} is the same thing as L_{AB}, i.e. that the appropriate referent of our concept of 'will' lies within the laws of nature. Moreover, I am arguing that the decomposition of the laws into L_{AB} and L_R is part of the definition of 'self' and 'not self' that an agent must engage in, with L_R representing those events and behaviours that the agent cannot control and takes no responsibility for.

Not only does this identification provide a referent for the term 'will', it also enables an analysis of the freedom to do otherwise. In particular, we can understand the freedom of the will W_{AB} in terms of the contingency of L_{AB}. The will is free in the sense of not being determined by anything outside itself, and while it plays a determining role in the agents actions it could also have been otherwise. The possibility

of doing otherwise, e.g. C, D or E, is then equivalent to the possibility of different laws, e.g. L_{AC}, L_{AD} or L_{AE}. Responsibility for the particular outcome B results from the inclusion of L_{AB} within the self.

One obvious requirement for this proposal to be coherent is that B must be a causal consequence of A under the laws L. Otherwise, there would be no L_{AB} available to identify W_{AB} with. However, if A were insufficient to cause B that would just mean there were additional causes of my choosing B not specified in A. In other words, if A genuinely captures the conditions that lead to my choosing B, then it must capture all the causal influences shaping my decision, and therefore W_{AB} can be identified with an L_{AB}. With this in mind, A may need to specify some *ceteris paribus* conditions, such as I am not about to be incinerated by a lightning bolt or evaporated in a nuclear blast, which ensure that I will be able to exercise my will and bring B about. Moreover, there may be factors which need to be included in A, e.g. unconscious or subliminal influences, which are not readily apparent to introspection. And, in fact, introspective knowledge of A may not be merely underspecified it may even be mistaken.

This fallibility should not be interpreted, however, as entailing that the will is a mere fiction. All our beliefs about our selves are error-prone and imprecise, and our knowledge of will is no exception. We would not assert that someone whose understanding of their digestive system is faulty has no colon or duodenum, nor did humans before William Harvey lack cardio-vascular systems. In identifying the physical matter of a body as belonging to a particular person, we do not require that the individual have perfect knowledge of that matter. Instead, what is important is that the body and its parts fulfill the right functions.

In the case of the will, the function it needs to realise is that of governing the relationship between perception and action. It needs to determine that A is followed by B, and in order to be free, it has to do so without itself being determined by anything else. Seeking the referent of will within the laws of nature provides a natural solution to these requirements.

Nonetheless, there are, of course, many compatibilist approaches to understanding voluntary action within a deterministic universe, which treat the agent as a purely material entity. For example, List (2014) has argued that an agent should be understood as a coarse-grained macroscopic entity that supervenes on fundamental physical microscopic entities and processes. Thus, while the behaviour of the latter could be entirely determined by the laws of nature, multiple possibilities would still be open to the agent if a single macroscopic state of the agent corresponded to multiple microscopic physical states having divergent futures. In this way, determinism at the level of physics can be reconciled with indeterminism at the level of agents. However, this indeterminism means that if the agent is free to do either B or C, then the causes differentiating one outcome from the other lie not in their psychological macro-states, but in the physical micro-states that the agent supervenes on.

Moreover, it would be preferable to analyse the freedom of voluntary behaviour directly rather than via the surrogate of an ambiguity over physical micro-states. Vihvelin (2004), for example, instead suggests that this freedom should be understood in terms of a bundle of dispositions, e.g. capacities for behaviour, that persist even when not exercised. Thus, under this dispositional analysis, an agent's ability to do otherwise is simply the availablity of a range of capacities, such as fluency in French or physical dexterity, in a given circumstance. Further, these capacities are to be analysed in much the same way that we might speak of an intact wine glass as fragile, that is as having a disposition to be easily broken, even while it remains undisturbed on a shelf. In particular, a disposition for behaviour B is to be understood as the possession of

properties, P, which together with the appropriate conditions, Q, are sufficient cause of B.

However, human bodies not only possess dispositions associated with voluntary behaviours, such as playing the piano or breaking promises, they are also disposed to involuntary behaviours, such as falling under gravity or being electrocuted. In each case, the initiation of these behaviours is driven by the conditions, Q, whose causal origins lie outside the agent in his environment. This is not unlike the the proposal of List (2014), where the ultimate causes of voluntary choices lay in physical micro-states below the level of the psychological macro-states of the agent.

Both aproaches attempt to analyse 'could have done otherwise' in terms of 'if it had been otherwise', in the sense that the doing otherwise is the consequence of counterfactual physical conditions. For List (2014), an agent with the same psychological macro-states can do otherwise when their physical micro-states are otherwise, while for Vihvelin (2004), an agent with the same dispositions can do otherwise when the relevant conditions are otherwise. In each case, the causes of these conditions and micro-states lie outside the agent, and neither proposal is compatible with a 'freedom to do otherwise' under identical physical conditions.

Here, I am suggesting that such a freedom is conceivable when, instead of analysing 'do otherwise' in terms of counterfactual physical conditions, we analyse it directly in terms of the laws that govern behaviour. That is, the contingency of the laws of nature is a contingency of different future behaviours given the same initial physical states, and this seems like the most immediate way to interpret 'doing otherwise'. Given this, the claim 'I could have done otherwise' can be naturally interpreted as a claim that this contingency belongs to the agent in some sense.

Thus, our conception of ourselves as agents with the capacity for voluntary action suggests a division between self and not-self can be drawn not just in the material world but also within the laws of nature. Moreover, as in the other - immunological, psychological, etc. - domains of self construction, this is a complex process which cannot be reduced to a simple formula. In particular, we cannot identify 'will' simply with those laws that act on our bodies. For example, neither falling under the force of gravity nor being poisoned by Arsenic are generally regarded as voluntary actions. We might voluntarily put ourselves into a situation that leads to one of those outcomes, such as stepping off the edge of a cliff or drinking contaminated water, but we cannot will not to fall once the step is taken nor will not to be poisoned once the Arsenic is absorbed.

On the other hand, accepting a job offer or choosing a flavour of icecream are usually taken to be voluntary, in the sense that we could have done other wise. Here, I have argued that this distinction can be thought of in terms of a decomposition of the laws of nature into voluntary and involuntary components in much the same way that matter is decomposed into body and environment.

5. Conclusions

If we accept that 'I could have done otherwise' is part of what defines the meaning of 'I', then when we think about what constitutes such an entity we should seek a referent for which such a claim is meaningful. Here, I have argued this suggests we should look not only at material structures but also at the laws of nature that govern them. In particular, I have proposed that what we call free will is best understood in terms of the components of those laws that govern our voluntary actions.

This identification of free will with the laws of nature runs counter to the common assumption that these concepts are in opposition. However, the possibility for conflict between them emphasises just how similar the two are. Both seek to support explanations of how B follows A, and therefore both concepts have a great deal in common. In fact, Reid (1788) suggested that the concept of causation is grounded psychologically in our sense of our own agency, our power to effect change in the world. If rather than viewing the will and the laws as competing explanations of action, we instead view them as complementary descriptions of the same phenomena then we can ground the freedom of the will in the contingency of the laws.

Lewis (1981) identified a relationship between the freedom of the will and the contingency of natural laws in his discussion of whether the ability to do otherwise implied an ability to break the laws of nature. There, he argued that the possibility of following a different course of action is not a possibility of breaking the laws governing that action but is instead the possibility of those laws being different. Followed to its conclusion, this suggestion that the possibility of doing otherwise is equivalent to the possibility of the laws being otherwise leads to the proposal in this article that the freedom of the will and the contingency of the laws of nature are the same thing.

Historically, a connection between the freedom of willed action and the contingency of the structure of nature has also been discussed in relation to voluntarist conceptions of God. Oakley (1961), for example, identifies the condemnation of 1277 as a turning point in the development of the concept of laws of nature, with the rejection of limits on Divine omnipotence leading to a conception of the regularities of nature as being expressions of Divine will. The contingency of this will, and therefore of nature, then diminishes the relevance of rationalist methods and instead promotes empirical enquiry. Thus, from this perspective, the idea of a contingent, unfettered act of will is one of the historical roots that has given rise to our modern conception of laws of nature.

With the dominance of experimental science, the prevalence of invocations of Divine will in the study of nature has diminished. Nonetheless, a conception of the universe, its matter and laws, as originating in some primordial creation event persists. Yet this idea, of the temporal origin as having some special status in relation to the genesis of nature, runs counter to the general scientific objective of finding the general principles and laws that describe natural processes across all times and locations. Hawking (1988), instead, compares the beginning of time to the North Pole of the Earth; both are places where one of our favoured co-ordinates terminates, yet in neither place are we justified in assuming the operation of unique processes. Any such singular phenomenon, occurring in only one place and time, would be beyond the scope of scientific enquiry, being neither subsumable under a general law, nor observable under replicable experiments.

However, while a unique act of Divine Will would lie outside the epistemological bounds of empirical investigation, the approach outlined here brings our everyday acts of will within the bounds of science, without sacrificing determinism or our ability freely to choose between alternatives.

Disclosure statement

The authors report there are no competing interests to declare.

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