Physics and Free Will: Is Everything Written in Stone?

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Book Jacket

Although the book is called *Free Will: What the Physics Says*, a more accurate title would have been *Free Will: What the Physics <u>Doesn't</u> Say*, because the overarching theme of the book is that physics does NOT tell us that we are not free. But that would have been hard to sell to the publishers. There are a lot of books on free will – a *lot* – but most of them start by saying 'physics tells us that all of our actions are determined by fundamental laws, or if they are not determined by fundamental laws, they are determined by fundamental laws together with unpredictable collapses of the wave-function' or some such thing. Built around these simple remarks is a highly articulated landscape of philosophical responses to the challenge physics is supposed to present to the view of ourselves as free agents. I am hoping that this book can fill a lacuna in this landscape by giving a much more adequate account of 'what physics tells us': i.e., the parts that are settled and the parts that are unsettled, how much we understand about our place in the universe, how physics has come to view notions like space, time, causation and law. These are all directly and deeply implicated in the stark opposition implicit in those simple pronouncements about what science tells us and freedom. The result of looking behind the veil of those pronouncements can be surprising, illuminating, and (I hope) helpful. And the result is that physics does NOT tell us that we are not free.

The book is organized into two parts. The first is addressed to questions of what we are and how we fit into the natural order. This is absolutely crucial to understanding whether and what sense we might be free. The second part of the book turns to the difficulty of locating our actions in the natural order and it addresses various arguments that are meant to undermine the pre-philosophical view of those actions as free. It is written in a manner that is jargon free and equation free, and meant to address the lay reader as well as the professional.

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Philosophy is like trying to open a safe with a combination lock: each little adjustment of the dials seems to achieve nothing, only when everything is in place does the door open.

Wittgenstein [i]

Preface

Physics has forced us to revise our world-views in surprising ways and has also opened up new mysteries. The mysteries that get the most play outside of science are the mysteries at the frontiers of the physics of the very large and the very small. Almost everybody in the academy these days knows about quantum mechanics, and about the Higgs boson, some may even know about Bells Theorem. Everybody knows about black holes and dark matter, some may even know about string theory and loop quantum. These are the problems that tend to grab the popular imagination and also attract the attention of philosophers of physics. But some of the most difficult unsolved problems are much closer to the human scale and have to do with reconciling the way that physics tells us the universe *is* and the way that we experience it. So, for example, in the best and most and established parts of our space-time physics, time appears as one dimension of a static, four-dimensional manifold of events. We do not have a good understanding of why time seems to have a direction, why the future seems different than the past, why time seems to flow, or even what that means.

Here is another mystery. The familiar physics that we all learned in the classroom, the Newtonian mechanical laws that predict everything from the behavior of tennis balls to the motions of the planets have the form of differential equations that give the state of a closed system at one time, with certainty, given its state at another time. The state of a system is given by the positions and momenta of all of the particles that compose it, and a closed system is a system that isn't subject to any influence from the outside, so this means that if we knew the positions and momenta of all of the particles that composed a system at some time in its history, we could predict exactly and with certainty the behavior of the system in the past and forever into its future. Usually we use those laws to predict the movements of systems like tennis balls or planets, which aren't truly closed, so before we can predict their behavior we have to take account of all the innumerable number of influences on them, something we are never able to do in practice, so we are never able to predict the behavior of such systems exactly and with certainty. That is the situation that we are accustomed to at the local level from our experience even with the simplest and most regular systems like tennis balls. When it comes to more complex systems, cars, trees, dogs and people, this sort of predictability is out the window. It is not just that these systems have too many parts, and the influences on them in the past are too many and varied to account for. It's that at every point new influences from different sources come into to play.

Sometimes in the carefully sheltered environment of a laboratory, scientists are able to construct systems whose behavior is precisely predictable, but our experience for real systems, out in the wild, is that regularity is the exception rather than the rule. Predictability is limited and always subject to exclusions. But the physics tells us that if we knew the positions and momenta of all of the particles that make up the universe *as a whole* at some point in its history – 100 years ago, say, or a hundred years before that, or a billion years before that - we would be able to calculate from the Newtonian laws – those innocent looking equations that Newton wrote down for the first time in the seventeenth century and that you learned on the first day of your classical mechanics class – the exact positions and momenta of all of the particles that compose the universe at every subsequent point in its history, forever into the future. That includes not only the eruptions of Mt. St. Helen and the trajectory of James Rodriguez's first effort against Uruguay in the 2014 world cup, but the movements of Joyce's hand as he penned the last pages of Ulysses, your decision about breakfast this morning, and – most peculiarly – your decision tomorrow, and the day after that, and the day after that. The position of your hands at this moment, what you do next, and every movement your body will make throughout your life… all of it, calculable exactly and with certainty, from the positions and momenta of all of the particles in the universe a billion years ago.

But that can't be right, can it? Surely when you are deciding how to act, there is nothing written into the fabric of the universe that decides the case until your choice is made. When you are wavering between two options, it comes down to your decision to determine which way history goes. This is as true for trivial decisions, like whether to wear grey or white socks in the morning, as it is for big decisions: whether to get married, have a child, or take a job in a distant place. We wring our hands and keep ourselves up at night when we are faced with decisions precisely because we think that our decisions ultimately determine out own futures, that we and that what we do is not set in stone before our decisions are made - as William James so evocatively put it - "in those soul trying moments in which the fates seem to hang in the balance, everything [really] is decided in the here and now."

The difficulty that a scientific vision of the world presents for what I am going to dub out direct, first-person apprehension of our control over our actions was captured by Lucretius back in 50 BC when he wrote:

" If all movement is interconnected, the new arising from the old, in a determinant order … if [there is nothing that] will snap the bonds of faith, the ever lasting sequence of cause and effect, what is the source of free will possessed of living things throughout the earth." [ii]

It gets a more modern and uncompromising expression in the mathematically precise framework of Newtonian physics, and it has been turned into a simple argument that challenges your ordinary everyday conviction that you control.

1. If determinism is true, then all our actions and thoughts are logically entailed by the laws of nature together with the initial conditions of the universe.

2. We have no control over the initial conditions of the universe.

3. We have no control over the laws of nature.

Therefore

4. We have no control over our actions.

This problem is what this book is about. It has been much discussed in the philosophical literature and I encourage readers to look at the literature. My approach is a little different from what one will find there because I am much more interested getting right down to the nitty gritty of what it really means to take physics as seriously as it can be taken and to view ourselves as part of the fabric of nature than most philosophers. And also because I am less interested in philosophical analyses of the concept of freedom or its connection to moral responsibility. I have no antecedent convictions about what would have to be true of me to be 'genuinely free'. I use the label 'freedom' to refer to refer to that sense that I think we all share, that our choices are up to us (and not just up to us, but *ultimately* up to us). The truth is that I'm just very puzzled by what that sense of freedom is and what it amounts to. The idea is determinate enough to seem jeopardized by determinism, but it is not easy to say more.

Those who know something about physics will wonder why I'm talking about the problem at all. Newtonian Mechanics is outmoded physics, and our best current microscopic theory – quantum mechanics – is *not* deterministic. But those who actually know a little quantum mechanics will see that the sort of indeterminism that quantum mechanics incorporates does not seem to help. I'll say more about this later, and hopefully convince you that substituting quantum mechanics for Newtonian Mechanics adds some messiness without helping the problem, and it is cleaner to conduct the discussion in the cleaner deterministic setting of Newtonian Mechanics. Another thought one might have is that we are not physical things, and hence not subject to the physical laws. Perhaps we are souls or immaterial substances. It is another well-known outstanding problem that nobody knows how to treat consciousness as a physical phenomenon. But that doesn't seem to help either. Even if we allow that our mental lives – our thoughts, decisions, and so on - are not physical phenomena and not subject to the laws of physics, our bodies *are* physical things, and so the movements of our bodies are determined by the initial conditions of the universe.

We are sometimes told that free will is something that we simply have to reject as mistaken or illusory if we are to believe that the world is as physics says. Physicists sometimes seem to think that the idea of free will is simply synonymous with a magical ability to subvert the laws of nature and to dismiss it out of hand. If I could adopt that attitude in good conscience, I would. The problem with it is that it papers over a very deep obscurity in the physical conception of the universe. As it stands we do *not* have an understanding of our place in a physical universe that is remotely adequate to our patent experience of ourselves as actors and agents in history. This book is an attempt to work out how exactly we are to think of ourselves and our place in the physical universe, on the assumption that that universe is adequately described by physics. Physics

itself, of course, is unsettled, and we will to see whether it is settled enough in relevant parts that we can engage these issues.

A clash of facades

Wittgenstein famously held that philosophical troubles were a kind of sickness that should be treated by rooting out the metaphysical pictures that give rise to them.[iii] I think that he is right that many of the most difficult and perennial philosophical problems have their roots in metaphysical pictures and that those mental pictures tend to be more elusive and resilient than explicitly held philosophical views. Problems like that have their purest expression in their most basic and naïve form, the way that they arise spontaneously for the man in the street. In the case of free will, the problem is that we have two pictures, each of which works quite well, in a limited way to capture the contours of an important set of relationships, but which clash quite spectacularly when they are brought together. There is the picture that we use when we are engaging in practical reasoning in which we are portrayed as internal loci of mental life, entering the causal order from outside, and controlling the movements of our bodies. And then there is the picture derived from physics of a material world governed by natural law, in which the movements of our bodies are determined by laws (or natural laws plus quantum transitions over which we have no control) from the initial conditions of the universe. The problem is a clash between those two pictures that needs to be resolved if we are to arrive at a convincing portrait of our place in the physical world.

Wittgenstein also thought that metaphysical pictures were philosophical excrescences, half-baked and dubiously consistent products of the imagination and that we would be better to do without them entirely. I have a somewhat more positive view of mental pictures, and a more gentle view of philosophical therapy. Mental pictures are indispensible tools, the product of a long history of evolutionary engineering to help us navigate a world that is – at a physically fundamental level – tremendously complex. Most of that complexity is outside our view, and can remain so, for everyday purposes. These mental pictures are more like facades than fictions. By that I mean that they are not simply misrepresentations with no interesting relation to reality, they are low dimensional projections that capture the practically important contours of different domains of action prepared in a form suited for human needs, but conceal a good deal of underlying complexity. What is often called 'common sense' is a collection of these kinds of facades. Our brains construct some of these facades as a kind of user interface for a human body. So, for example, common sense thinks of solid objects as made of continuous matter, even though science tells us that they are mostly composed of empty space, because we don't need to know the atomic substructure of a table to know that we can't walk through it.[iv] Some of them we inherit from our culture in the form of metaphors built into our languages and inferential practices. We speak of the sun as rising and setting, for example, and time as flowing like a river. But some facades are deeply entrenched and really fundamental to how we think of ourselves and of the world. The 'façades' that have this character have survived because they serve us well. The problem is that they can lead to trouble when employed in conjunction with one another. This is what I will suggest

happens in the case of free will. There is a clash of facades that is defused by exposing the real structures behind the scenes supporting the façades.

So what I want to do in this book is articulate the intuitive conflict, try to explicate the notions of self, causation and natural law implicit in that conflict, and replace those notions with something that more accurately reflects what science tells us both about the world and about ourselves.[v] I think that we can find the beginning of a way of thinking that resolves the very real conflict set up by the clash of façades, a way of thinking that leaves us with a vision of ourselves that preserves the important core of our practices. The new vision is *not* wholly conservative, and it is not presented as a philosophical analysis of our concept of free will or the concept of a self. It forces us to change our ideas, in a way that can serve as the basis for deep self-understanding. By deep self-understanding I don't mean something that we need to negotiate the everyday needs of finding our way around a changing macroscopic environment. I mean something that is needed to answer reflective questions about the nature of agency and responsibility, the meaning of life, and so on.

There are different ways of expressing what science has taught us about ourselves, and it is fashionable to express what it teaches in negative terms. It is very common nowadays in the literature on neuroscience and in the philosophy of mind to say that science has shown us that there are no such things as selves, or that physics has shown us that freedom is an illusion. This is a choice of expression, and I think that it is mistaken in the same way that the claim that science has shown us that nothing is solid, weighty, or red is mistaken. I do not deny any of the scientific results on which those claims are made. Certainly, a lot of everyday beliefs about what these things amount to are not correct. But a proper scientific understanding replaces the façades with a more articulated view that provides the material for developing and deepening our ideas about selves and freedom, for reinterpreting these ideas in the same way that the discovery of atomic structure invites us to reinterpret our ideas about solidity.

The naturalist always operates at a disadvantage, because the simple pictures associated with façades are always imaginatively compelling and the resolution is complex, far from common sense, and unintuitive. That is the nature of the beast. Even if accepted as the literal truth, the mind will relax back into its ordinary ways of thinking, the tension will continue to be felt, and one will have to talk oneself out of the simplistic ideas about what it is to be free or to be a self. I don't pretend otherwise for what I say here. The reason for going through this exercise is not necessarily to exorcise the simple pictures built into our everyday ways of thinking, but to resolve the clash of facades and to have a basis from which to navigate the kinds of questions that demand a deeper kind of self-understanding.

The book is organized into two parts. The first is addressed to questions of what we are and how we fit into the natural order. The second part of the book turns to the difficulty of locating our actions in the natural order and it addresses various arguments that are meant to undermine the pre-philosophical view of those actions as free.

On audience

My hoped for audience is not the professional philosopher with settled views, the confirmed religious devotee, or the person with extra-scientific commitments to particular notions of natural law or causation. My hoped for audience is someone without fixed ideas, worried by a very traditional problem, viz., that if we are physical beings in a world governed by natural laws we can not properly view our freedom as anything but illusory. This is a philosophical topic, but it is also a topic for humanists and social scientists, for the lawyer or physicist, and for the man on the Clapham omnibus with an interest in understanding what it is to be human. Professional philosophy has its own conventions and its own standards of discussion. Those conventions serve a purpose, but they tend to make philosophy insular, esoteric, and about as uninviting to outsiders as it can be. I do not want someone without a professional philosophical education to feel like a stranger in this book. And that is why the versions of the questions, problems, or patterns of reasoning I address are not the ones that will engage the professional philosopher, but the ones that engage the thoughtful layman in the form in which they occur to him. The book deliberately flouts some of the conventions of academic philosophy. It does not batter readers with argument, it ignores some of the contemporary pre-occupations, and it presupposes no knowledge of the philosophical literature. It is less argumentative, less scholarly, and more constructive than academic philosophy, more willing to be wrong. The jargon and the finely articulated and multiply compounded 'isms' of the professional debate are largely eschewed. Make no mistake, however, this is philosophy. It is at times highly abstract and analytical. And it is often hard work. The discussion is as demanding and unpatronizing and opinionated as anything that is written for a professional audience.

There is another way in which this book flouts philosophical convention. It does not insist on finality and adopt an attitude of faux certainty. It is more like the record of a struggle to gain some understanding of really hard questions, to resist easy solutions (physics is wrong, or freedom, flow and self are myths to be rejected by the advancing tides of science), and to reject Hume-style double-thinking (believing one thing in the philosophy room and another in day to day life, over backgammon with friends).[vi] Many of the pieces of my own position are more fully developed as philosophical positions in auxiliary pieces that I have written directed to the professional literature, but I wanted to articulate the full picture in one place in a more accessible manner. There is an idea – both in the academy and in the public – that a scientific world-view is inhospitable to human freedom. And there are undoubtedly philosophical interpretations of what science tells us about ourselves that encourage that view.[vii] But this science-is-against-freedom perspective is not, in my view, what science tells us about ourselves. The scientific vision of the world supports humanistic values organized around a conception of ourselves as the source of our behaviors and can be a rich source of self-understanding.

I have learned much and borrowed opportunistically from many others, but throughout the book, scholarly discussions are relegated to footnotes, and references are limited to those that are useful to nonprofessionals, pointers to resources where they are discussed in the texts.[viii] I have focused on saying what I think is right in a brief and forthright way. There are several excellent introductions for those interested in the professional literature, see Robert Kane's *A Contemporary Introduction to Free Will*, Michael McKenna's entry on compatibilism in the *Stanford Online Encyclopaedia to Philosophy* and his *Conversation and Philosophy*, *Four Views on Free Will* by John Martin Fischer, Robert Kane, Derk Pereboom and Manuel

Vargas.

Finally, I should also apologize if I seem to repeat myself a lot. This is the way I think. I come at things from different angles and repetition is a way of noting for myself that I am arriving at the same place. On the positive side, this may make things easier to read in pieces.

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[i] Found in *Personal Recollections* (1981) by Rush Rhees, Ch. 6, Conversation of 1930, Similar to Wittgenstein's written notes of the "Big Typescript" published in *Philosophical Occasions 1912-1951* (1993) edited by James Carl Klagge and Alfred Nordmann, p. 175: "Philosophical problems can be compared to locks on safes, which can be opened by dialing a certain word or number, so that no force can open the door until just this word has been hit upon, and once it is hit upon any child can open it."

[ii] *De Rerum Natura.*

[iii] Wittgenstein's view was of course much more complex and subtle. These brief remarks – though they serve an expository purpose – are somewhat of a caricature. For a nice discussion of Wittgenstein's view of philosophy, see Biletzki, Anat and Matar, Anat, "Ludwig Wittgenstein", *The Stanford Encyclopedia of Philosophy* (Spring 2014 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2014/entries/wittgenstein/>.

[iv] By common sense, I mean pre-theoretical common sense, something closer to what Sellars called 'the manifest image' of the world. Actual common sense, in at least among some groups, has become so pervaded by science that this distinction is no longer so clearly drawn.

[v] There are epistemic questions that surround the question of whether why we should treat science as authoritative and I don't assume that the science itself is settled, but I take it for granted that it has to be an ongoing part of the development of science to understand what it seems to be telling us about ourselves even as it develops.

[vi] "I find myself absolutely and necessarily determined to live, and talk, and act like other people in the common affairs of life. But notwithstanding that my natural propensity, and the course of my animal spirits and passions reduce me to this indolent belief in the general maxims of the world, I still feel such remains of my former disposition, that I am ready to throw all my books and papers into the fire, and resolve never more to renounce the pleasures of life for the sake of reasoning and philosophy." Treatise, (B1.4.7)

[vii] See, for example Alexander Rosenberg, *The Atheist's Guide to Reality*, W. W. Norton & Company; 1 edition (December 10, 2012).

[viii] These include Hume, above all. Ramsey, directly. Korsgaard, Lynn Rudder Baker, Moran, Murdoch on freedom, Wilson, Pearl, and C.D. Broad. John Perry. Harry Frankfurt, Elizabeth Anscombe. Mark Wilson, Barry Loewer. Though my borrowing and learning have been selective and opportunistic. often taking what I want without regard for their intent.