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Temporal naturalism



Lee Smolin

Perimeter Institute for Theoretical Physics, 31 Caroline Street North, Waterloo, ON, Canada, N2J 2Y5

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ABSTRACT

Two people may claim both to be naturalists, but have divergent conceptions of basic elements of the natural world which lead them to mean different things when they talk about laws of nature, or states, or the role of mathematics in physics. These disagreements do not much affect the ordinary practice of science which is about small subsystems of the universe, described or explained against a background, idealized to be fixed. But these issues become crucial when we consider including the whole universe within our system, for then there is no fixed background to reference observables to. I argue here that the key issue responsible for divergent versions of naturalism and divergent approaches to cosmology is the conception of time. One version, which I call temporal naturalism, holds that time, in the sense of the succession of present moments, is real, and that laws of nature evolve in that time. This is contrasted with timeless naturalism, which holds that laws are immutable and the present moment and its passage are illusions. I argue that temporal naturalism is empirically more adequate than the alternatives, because it offers testable explanations for puzzles its rivals cannot address, and is likely a better basis for solving major puzzles that presently face cosmology and physics.

This essay also addresses the problem of qualia and experience within naturalism and argues that only temporal naturalism can make a place for qualia as intrinsic qualities of matter.

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1. Introduction

The subject of this essay¹ is *naturalism*, the philosophical stance most closely associated with what might loosely be called the scientific world view. My particular aim is to point out the role that our conception of time plays in the scientific conception of nature and to advocate a particular form of naturalism based on an embrace of the reality of time, in the sense (to be defined carefully below) of the present moment and its passage.

I will begin by defining the form of naturalism I advocate, *temporal naturalism*, and distinguish it from its main rival, *timeless naturalism*, the view that what is really real is the whole history of the universe, taken as one. Timeless naturalism includes the block universe interpretation of general relativity. One variant of it is the naturalism based on a timeless *pluralism of moments* advocated by Julian Barbour. I then show that the choice of naturalisms has

¹ E-mail address: ismolin@perimeterinstitute.ca

¹ Portions of this essay have appeared in revised form in [Mangabeira Unger & Smolin \(2014\)](#).

consequences for the practice of science, particularly cosmology, due to the implications of the nature of time for the conception of laws.

Timeless naturalism is similar to the view philosophers call “eternalism” and temporal naturalism has elements in common with the philosophers’ “presentism”, but my categories differ from the older ones, among other reasons, because of an emphasis on the nature of law with regard to time.

This essay is part of a larger project whose aim is radically to reconfigure the practice of science on a cosmological scale in order to admit three theses: (1) the reality of time, (2) the evolution of laws with respect to that time and (3) the uniqueness of the single causally closed universe that unfolds in time. This project was conceived with Roberto Mangabeira Unger and its main vehicle is a book jointly written with him ([Mangabeira Unger & Smolin, 2014](#)) to which my book, *Time Reborn* ([Smolin, 2013](#)) may serve as an introduction. It is the combination of the three theses that makes this not just a rerun of the old presentist–eternalist debate. In particular, a major claim of [Smolin \(2013\)](#) and [Mangabeira Unger and Smolin \(2014\)](#) is that temporal naturalism has a much larger range of empirical adequacy than its rivals because it alone

allows a conception of laws which can evolve in time. This, we argue, is necessary if we wish the choice of laws to be explicable on the basis of hypotheses that are falsifiable by the results of doable experiments.

The present essay summarizes the main arguments of Smolin (2013) and Mangabeira Unger and Smolin (2014) and then advances the program in two directions.

1. Recent work with Marina Cortes (Cortês & Smolin, 2015; Cortês & Smolin) has emphasized three aspects of a reconfiguration of cosmology within temporal naturalism: (i) framing the fundamental laws as asymmetric and irreversible in time, (ii) drawing out the consequences of an insistence on the uniqueness of elementary events (an under explored consequence of Leibniz's Principle of the Identity of the Indiscernible) and (iii) finding a role for energy and momentum as necessarily intrinsic quantities within a relational universe. One consequence of Cortês and Smolin (2015) and Cortês and Smolin is an elegant solution to the longstanding problem of getting classical space-time to emerge from the semiclassical limit of a theory of causal sets (Bombelli, Lee, Meyer, & Sorkin, 1987).
2. As emphasized by Strawson (2013) and Nagel (2012), naturalism must have a role for qualia and experience, if it is to live up to its defining aspiration that everything that we know that exists is part of the natural world. I argue below that only temporal naturalism can accommodate qualia and experience as intrinsic qualities of events in nature.

1.1. What is naturalism?

Let me start with a definition:

Naturalism is the view that all that exists is the natural world that is perceived with, but exists independently of, our senses or tools which extend them; naturalists also hold that science is the most reliable route to knowledge about nature.

This is a good first try at a definition but its simplicity hides ambiguities and traps. Unless we are idealists we do not believe that all that exists are our perceptions. What we believe is that our senses give us evidence for the existence of a natural world, which can be learned about through our sensations but which exists independently of them.

However our senses, and the experiments and observations which we carry out to extend them, only give us direct acquaintance with the qualia which are the sensory elements of our experience. They do not give us immediate acquaintance with, or direct knowledge of, the rest of the natural world. They can then only provide evidence for hypotheses which we make concerning the natural world. Thus, as naturalists we are constrained to deal in indirect knowledge of the object of our study and we must be always conscious that this knowledge is incomplete and never completely certain. But since we believe all that exists is the natural world we must admit that incomplete and tentative knowledge is the best that can be had concerning what exists.

Because of this naturalists can hold quite strikingly different views about nature-and still be naturalists. For example, many naturalists believe that everything that happens in nature is governed by universal and unchanging laws. But one doesn't have to believe this to be a naturalist-because we must admit the possibility that experiment could provide evidence for phenomena that are governed by no definite law. For example, if we believe that no hidden variables theory determines the precise outcomes of measurements on quantum systems for which quantum mechanics only gives probabilistic predictions, then we believe

there are phenomena that are not law governed at all. Indeed if we follow Conway and Kochen then quantum phenomena are in a well defined sense free (Smolin). Or, if we believe the standard big bang cosmology expressed in the context of classical general relativity then we implicitly believe that no law picks the initial conditions of the universe. Or to put it another way, no law governs which solution to the equations of general relativity is somehow uniquely blessed with describing the actual history of the universe.

Another thing that some, but not all, naturalists believe is that everything that exists in the natural world can be completely described by the language of physics. There are varieties of positions held with respect to emergence and reduction; but it is quite reasonable to believe that matter is made out of elementary particles which obey general laws, but that complex systems made out of many atoms can have emergent properties not expressible in or derivable from the properties of elementary particles.

1.2. Naturalism through the looking glass

Many naturalists hold beliefs about the natural world that are more firmly held and expressed than the tentative nature of scientific hypotheses allows. These are often beliefs of the form:

Our sense impressions are illusions, and behind them is a natural world which is really X.

Such a view can either be an ordinary scientific hypothesis or a metaphysical delusion, depending on what X is asserted to be. When X is a statement like "made of atoms" this is an innocuous scientific hypothesis which carries little metaphysical baggage and is, in fact, very well confirmed by diverse kinds of experiments. (But this was of course not always the case.) But statements of this form can be traps when X is a big metaphysical assertion which goes way beyond the actual evidence.

A common and widely believed example is the claim that *X (the universe) is really a timeless mathematical object* (Tegmark, 2008). Whether that mathematical object is a solution to an appropriate extension of general relativity or a vector in an infinite dimensional space of solutions to the Wheeler-deWitt equation of quantum cosmology, there is a big stretch from a statement of the form,

Some experimental evidence concerning a specified range of phenomena is well modeled by a mathematical object, O,

which is a statement which might or might not be supported by evidence, and a metaphysical assertion that *The universe is really a mathematical object*, which is not by any reach of the imagination an hypothesis that could be tested and confirmed or falsified.

What is troubling is that statements of the form, *Experience is an illusion, the universe is really X* are common in religion. When naturalists make statements of this kind, they are falling for what might be called the transcendental folly. They are replacing the concrete natural world by an invented conception, which they take to be "more real" than nature itself. Thinking like this turns naturalism into its opposite.

Much that passes for naturalism and physicalism these days are instances of transcendental folly.

A symptom of the transcendental folly is the move from "Sense impressions give unreliable knowledge of nature, nature is instead truly X" to "Sense impressions are incompatible with the concept that the world is X", so qualia must not exist. But the one thing we can be sure of is that qualia exist. Therefore, as Strawson (2013) and other philosophers of mind emphasize, if we are naturalists and believe everything that exists is part of the natural world then

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