

The future is the past

Roger Schlafly

April 10, 2014

Abstract: Modern physics has come to conclusions about time, causality, and reality that have outpaced our language and intuitions. The idea that humanity should steer the future is a cognitive prejudice, based on an ancient misperception of time. Modern physics has brought us a new fatalism about the future, and more reason to focus on the past. The consequence is that there is no future to steer, and humanity is not what we expect.

Submitted to the FQXi.org 2014 Essay Contest answering: “How Should Humanity Steer the Future?”

Author Bio: Roger Schlafly has a BSE from Princeton U, and a PhD in Mathematics from U California Berkeley, under I. Singer. He blogs at DarkBuzz.com.

Block theory of time

Time is what distinguishes the past from the future. The chief intuitive difference is that we remember the past, and we cause the future. Time marches forward, and as we cause events, they become the history that we remember.

While this view of time seems obvious to a small child, there is an opposite view that the present flow of time is just an illusion. That view is sometimes called *block time*, and its roots go all the way back to the ancient Greek philosopher Parmenides. Albert Einstein and other smart people have subscribed to such a view, and even claimed that relativity theory requires it. Brian Greene taught a 2014 relativity course on WorldScienceU.com, and he makes some philosophical comments about time in the module on “The Reality of Past, Present, and Future”. After explaining some of the difficulty with relativistic simultaneity, he concludes:

So what this collectively tells us is that the traditional way we think about reality — the present is real, the past is gone, the future is yet to be — that is without any real basis in physics. What we are really learning from these ideas is that the past, the present, the future, are all equally real.

Albert Einstein had a similar view, as reported by Rudolf Carnap:

Einstein said that the problem of the Now worried him seriously. He explained that the experience of the Now means something special for man, something essentially different from the past and the future, but that this important difference does not and cannot occur within physics. That this experience cannot be grasped by science seemed to him a matter of painful but inevitable resignation. [Mer]

Einstein wrote in 1955, just before his death:

People like us, who believe in physics, know that the distinction between past, present, and future is only a stubbornly persistent illusion.

Hermann Weyl wrote in 1949:

The objective world simply is, it does not happen. Only to the gaze of my consciousness, crawling upward along the life line of my body, does a section of this world come to life as a fleeting image in space which continuously changes in time.

A 2010 Scientific American article says that many physicists argue that there is no such thing as time, and explains:

As you read this sentence, you probably think that this moment — right now — is what is happening. The present moment feels special. It is real. However much you may remember the past or anticipate the future, you live in the present. Of course, the moment during which you read that sentence is no longer happening. This one is. In other words, it feels as though time flows, in the sense that the present is constantly updating itself. We have a deep intuition that the future is open until it becomes present and that the past is fixed. As time flows, this structure of fixed past, immediate present and open future gets carried forward in time. This structure is built into our language, thought and behavior. How we live our lives hangs on it.

Yet as natural as this way of thinking is, you will not find it reflected in science. The equations of physics do not tell us which events are occurring right now — they are like a map without the “you are here” symbol. The present moment does not exist in them, and therefore neither does the flow of time. [Sci]

These quotes are not just describing a philosophical or metaphysical view. They are claiming that modern science compels the block theory of time. The more traditional view, called the *A theory of time*, with time flowing from the present to the future, is wrong, has no basis in physics, and must be rejected.

The scientific argument against the flow of time is that the fundamental laws of nature are deterministic and reversible, and so the progress of time is an illusion and we have no free will to affect the future. The relativity argument is that Minkowski diagrams show all times at once, so there cannot be anything special about any particular time.

Recent papers by physicists appear to be overwhelmingly in favor of the block theory of time, and against the flow of time. Most philosophers also favor the block theory of time, over the flow of time, according to a recent poll. [Phil] If they are right, then we are no more able to steer the future than to steer the past.

Personally, I cannot tear myself away from my child-like view that I am living in the present, and from my mathematical understanding of dynamics as describing a flow of time. But for the purpose of this essay, I yield to the wisdom of the experts.

The politics of causality

Beliefs in the philosophy of time are surprisingly political. Christians, libertarians, and right-wingers tend to believe in free will, personal autonomy and responsibility, and individual liberties and decision making. Marxists, atheists, and leftists tend to believe in historical determinism, unconscious human behavior, and fatalism.

The great liberal atheist pacifist logician and philosopher Bertrand Russell wrote in a 1913 essay on causality:

In the following paper I wish, first, to maintain that the word "cause" is so inextricably bound up with misleading associations as to make its complete extrusion from the philosophical vocabulary desirable; ...

All philosophers, of every school, imagine that causation is one of the fundamental axioms or postulates of science, yet, oddly enough, in advanced sciences such as gravitational astronomy, the word "cause" never occurs. ...

The law of causality, I believe, like much that passes muster among philosophers, is a relic of a bygone age, surviving, like the monarchy, only because it is erroneously supposed to do no harm. ...

The law makes no difference between past and future: the future “determines” the past in exactly the same sense in which the past “determines” the future. The word “determine,” here, has a purely logical significance: a certain number of variables “determine” another variable if that other variable is a function of them. [Rus]

His argument is that relativity and other scientific principles have convinced him of the block theory of time, and he concludes that free will and our “subjective sense of freedom ... are mere anthropomorphic superstitions”.

Einstein was of course a determinist, a socialist, a pacifist (except for bombing Germany), and a member of various Communist front organizations.

Later philosophers have summarized the view this way:

Imagine a universe (Universe A) in which everything that happens is completely caused by whatever happened before it. This is true from the very beginning of the universe, so what happened in the beginning of the universe caused what happened next, and so on right up until the present. For example one day John decided to have French Fries at lunch. Like everything else, this decision was completely caused by what happened before it. So, if everything in this universe was exactly the same up until John made his decision, then it had to happen that John would decide to have French Fries. [Nic]

In public surveys, ordinary people (not schooled in Marxism or other leftist philosophies) overwhelmingly reject this deterministic view: And so the leftist atheist evolutionist biologist Jerry Coyne writes:

To me, the data show that the most important task for scientists and philosophers is to teach people that we live in Universe A. [Coy]

His website is devoted to convincing people that biological evolution is true and wonderful, that religion is false and poisonous, that we have no free will, and that we should support various leftist causes such as the abolition of civilian handguns.

Neuroscientist Sam Harris is the most notable proponent of atheism today, and he adamantly argues that “the facts tell us that free will is an illusion.” He has written:

If determinism is true, the future is set — and this includes all our future states of mind and our subsequent behavior. And to the extent that the law of cause and effect is subject to indeterminism — quantum or otherwise — we can take no credit for what

happens. There is no combination of these truths that seems compatible with the popular notion of free will. [Har]

Seth Lloyd makes a similar point:

Although quantum mechanics implies that events are intrinsically unpredictable, the ‘pure stochasticity’ of quantum mechanics adds only randomness to decision making processes, not freedom. ...

By the end of the twentieth century, Steven Pinker could declare confidently [7] that ‘a random event does not fit the concept of free will any more than a lawful one does.’ If determinism robs us of agency, then so does randomness. [Llo]

Interpretations of quantum mechanics show a similar dichotomy, with some being deterministic and some being stochastic (with intrinsic randomness). No experiment has been able to distinguish these interpretations, so apparently there is no scientific means to resolve the dichotomy.

The history of biological evolution shows a similar divide between those who have *causalist* and *statisticalist* views. That is, some look at the history of life on Earth and see systematic algorithmic development everywhere, while others see random chance everywhere.

There is no experiment or scientific method to distinguish these views. One can replicate an experiment involving a silicon chip or a rocket launch into orbit, but no one can perfectly replicate radioactive decay or human behavior. So it is possible to rationally believe that the world could be in some middle ground between determinism and randomness, and that humans have consciousness and free will.

Nevertheless our leading physicists have adopted materialist and reductionist philosophies that require determinism or randomness, preferably determinism. This philosophy ranges from subatomic physics on up to human moral judgments. For example, Lawrence Krauss argues:

Ultimately, I think our understanding of neurobiology and evolutionary biology and psychology will reduce our understanding of morality to some well-defined biological constructs.

Leftist atheist science writer Chris Mooney believes that political goals can be achieved by increasing acceptance of biological evolution over God. He argues that belief in teleological thinking, agency detection, and group morality are major deterrents to people accepting evolution over God. Teleology is a doctrine explaining phenomena by their ends or purposes. Agency means carrying out the will of another. He quotes a psychology professor as saying:

Natural selection is like quantum physics ... we might intellectually grasp it, with considerable effort, but it will never feel right to us. [Moo]

In a 2005 curriculum controversy, 38 Nobel Laureates wrote a letter to the Kansas State Board of Education urging that a modern version of evolution be taught:

Logically derived from confirmable evidence, evolution is understood to be the result of an unguided, unplanned process of random variation and natural selection.

Apparently some retro folks in Kansas still believe that life has a purpose, that creatures have both the capacity and the physical ability to act in the world according to their own desires, and that men are morally responsible for their behavior.

Quantum time

The time reversibility of quantum mechanics is a matter of some debate. (Technically quantum field theory is CPT invariant, but I am ignoring the CP reversal.) Under the Copenhagen interpretation described in most textbooks, a measurement entails an irreversible collapse of the wave function.

My naïve view of time is that the past is definite, the present is now, and the future is uncertain. However I have learned that this is wrong. A more modern quantum mechanics interpretation is that the past is not definite, but is a collection of consistent histories, and that the wave function never collapses. A true commitment to time reversibility requires a belief in the many worlds interpretation, a version of the multiverse that is increasingly popular among physicists today.

Under the modern view, any possible future scenario with a nonzero probability must actually happen in some of the alternate universes. Likewise the possible multiple past scenarios all happened as well.

The practical consequences of quantum time are not appreciated by the public.

Quantum mechanics is peculiar among scientific theories in that it can be interpreted as having the possibility of free will built into the theory. That is, certain outcomes seem unpredictable, with no explanation given, so we are left to guess whether the reason is a hidden mechanical cause, intrinsic randomness, or the will of a conscious being. The last possibility is normally excluded for metaphysical reasons, such as cosmologists arguing that there could be no consciousness during the first second of the big bang.

Thus free will is possible, but disregarded and philosophically inconvenient.

The consequence of these quantum worlds is not just a lack of free will. All decisions are just illusions as the opposite decision is also being made in a parallel universe. Randomness is also just an illusion, as all possibilities must exist in parallel universes.

Max Tegmark in the March 12, 2014 episode of the TV show *Through the Wormhole* uses multiple universes to deny randomness:

Luck and randomness aren't real. Some things feel random, but that's just how it subjectively feels whenever you get cloned. And you get cloned all the time. ... there is no luck, just cloning.

Thus you do not have free will to make a decision, and you cannot even make a random decision. You just make predetermined decisions that only look like decisions because you do not see your clone making the opposite decision in a parallel universe.

Under this view, there is little reason to feel pride or guilt about your decisions. You might think that you made a decision to heroically save a man's life, but you really just created a clone to kill the man in a parallel universe. Both actions were predetermined, and you are incapable of making choices or causing anything. While everything is determined since the

big bang, it is nearly impossible to be personally certain of anything because quantum mechanics cannot tell you which parallel universe you will inhabit.

Niels Bohr, Werner Heisenberg, and Erwin Schrödinger would have regarded the multiverse as crazy, but it is increasingly accepted by mainstream physicists today.

The folly of counterfactuals

The supposed time problem is with *probabilism*, which has been defined as the doctrine that “the universe is such that, at any instant, there is only one past but many alternative possible futures.” As the universe evolves, one turns out to be real while the others are counterfactual. While probabilism was the accepted wisdom for centuries, it is called “ugly” by modern physicists. [Pag]

The English language has the defect that these concepts are integrated, and we take them for granted. We have past, present, and future tenses in verbs, as if these were meaningful concepts. The language has effects on how we think. Those speaking futureless languages like Chinese and German have been shown to be less likely to distinguish the future from the present in their economic behavior. [Che]

English also makes it easy to talk about possibilities that do not actually happen. It has a construction called the *subjunctive conditional* for counterfactuals. Statements that describe reality are in the indicative mood, such as “pigs do not have wings” or “pigs do not fly.” So are straightforward conditional statements, like “if pigs have food, they eat.” If you want to suggest some sort of imaginary world in which pigs fly, you need the verb to be in the subjunctive mood, such as “if pigs had wings, they could fly.”

Counterfactuals were essential to Newtonian physics, and the textbooks are full of them. But they became meaningless in quantum mechanics. As Asher Peres explained, “unperformed experiments have no results.” Richard P. Feynman's quantum mechanics textbook has his version of that slogan:

Another thing that people have emphasized since quantum mechanics was developed is the idea that we should not speak about those things which we cannot measure. (Actually relativity theory also said this.) [Fey]

That was the view of Bohr and Heisenberg, but its supporters seem to be dying off. Among the multiverse fans today, you can speak of any scenario you please, as they are all real in a parallel universe. And physicists do not have qualms against speaking about unmeasurable things anymore. You just have to ignore the paradoxes and how it does not feel right.

We need changes to the English language to keep up with physics. Grammatical tenses and subjunctives are the things that we should not speak about, because modern physics rejects them.

The holographic universe

Since the discovery of the differential calculus, scientists have described the world in terms of differential equations. Such equations have become essential to our materialist reductionist and scientific view. According to Henri Poincaré's 1902 book, the aether was invented in order to support differential equations describing nature. [Poi] Many

theoretical physicists today are preoccupied with finding a theory of everything as differential equations.

Differential equations are typically solved by showing that the solutions are determined by either an initial value problem or a boundary value problem. In the former case, knowing physical variables at one time determines them at all future time. In the latter, physical variables on the boundary determine the values on the interiors.

If you believe in a differential equation theory of everything and in a solvable initial value problem, then determinism follows.

In the past 20 years, another form of determinism has developed. The most highly cited paper in high energy physics is the 1997 Juan Maldacena discovery of the AdS/CFT correspondence. It only applied directly to some completely artificial and nonphysical models of the universe, but the excitement is based on the idea that our 3-dimensional spatial universe is somehow determined by a 2-dimensional cosmological horizon. That is, we are just a hologram defined by some giant boundary value problem.

While not everyone agrees that we are a hologram, they are persuaded by the mechanistic world view and mathematical reductionism that Poincare described a century ago. And with that goes various forms of temporal and spatial determinism, meaning that much of reality is an illusion.

The new multiverses

The recent BICEP2 announcement of primordial evidence for cosmic inflation has generated new enthusiasm for a cosmic multiverse. Under some inflation models, an infinite number of unobservable universes are being created. Once you accept infinity for that number, then you can imagine all possible scenarios being played out in other worlds, just as you can imagine all possible books being encoded in the digits of the number pi.

The Carl Sagan TV show *Cosmos* was remade in 2014, and the star of the first episode was the medieval monk Bruno who was executed for advocating various heresies. He was portrayed as a martyr of science for asserting an infinity of worlds just like Earth and inhabited with humans. The show says that he was a non-scientist making a lucky guess, but he was essentially right.

One problem with an infinity of worlds is that it becomes hard to make sense out of probability. There is very little basis for saying that any universe is any more likely than any other. Usually we must resort to the Laplace principle of indifference, which just means that we consider all possibilities equally likely when there is insufficient reason to do anything else.

When there are infinitely many equally likely worlds, then we are faced with various logical paradoxes. The probability that we are in any particular world is zero. The infinity could mean that all possible worlds are realized in some universe somewhere. The universes could also include Boltzmann brains and simulations like the 1999 movie *The Matrix*. Applying probability has led some to conclude that we are more likely to be living in a simulation than in reality.

NBC News reported:

Theoretical physicist Michio Kaku has been talking about parallel universes and other seemingly crazy ideas on TV for years — and now he admits he's "secretly smiling" over the fact that this week's findings about Big Bang inflation make those ideas look a little less crazy.

Kaku, a string theorist, says that string theory could provide the answer ... or answers. The cosmic parameters for string theory suggest that the number of possible universes could amount to around 10 to the 500th power. That's a 1 with 500 zeroes after it. Such a scenario offers so many possibilities for parallel universes that in some of them, "Elvis Presley is still alive," Kaku joked. [NBC]

It is hard to tell when Kaku is joking, but I think that he was dead serious about Elvis. There are several different concepts of parallel universes, and most of them allow almost any possibility that is not self-contradictory, and that would include Elvis.

If we are living in a simulation, then the possibilities are unlimited. Elvis could not only be alive, he could be young again.

The future determines the past

The old paradigm is that the past determines the future. The new paradigm is that the future determines the past. We are at the precipice of what Thomas Kuhn called a *paradigm shift*. The crucial defining features for such a change in view are what he called *incommensurable* and *arational*. That is, there must be no metrics for comparing the old view to the new one, and there must be no rational preference for the new view. As he described scientific revolutions, these shifts are largely cultural, as elite scientists switch to the new view and everyone follows like sheep.

While there cannot be hard scientific evidence, the view that the future determines the past can be quite enlightening. It frees us from worrying about what might happen, or from taking any personal responsibility for our decisions. It allows us to have more liberal attitudes towards criminals, sinners, morons, crackpots, and others.

Consider a mundane decision to walk along the top of a cliff. Conventional advice would be to be safe by staying away from the edge. But as Tegmark explains, that safety is only an illusion. What you perceive as a decision to stay safe is really the creation of a clone who jumps off the cliff. You may think that you are safe, but you are really jumping to your death in an alternate universe.

Armed with this knowledge, there is no reason to be safe. If you decide to jump off the cliff, then you really create a clone of yourself who stays on top of the cliff. Both scenarios are equally real, no matter what you decide. Your clone is indistinguishable from yourself, and will have the same feelings, except that one lives and the other dies. The surviving one can make more clones of himself just by making more decisions.

This revisionist understanding of time suggests that we view causality backwards.

A popular newspaper article explained:

If retrocausality is real, it might even explain why life exists in the universe — exactly why the universe is so "finely tuned" for human habitation. Some physicists search for deeper laws to explain this fine-tuning, while others say there are millions of

universes, each with different laws, so one universe could quite easily have the right laws by chance and, of course, that's the one we're in.

Paul Davies, a theoretical physicist at the Australian Centre for Astrobiology at Macquarie University in Sydney, suggests another possibility: The universe might actually be able to fine-tune itself. If you assume the laws of physics do not reside outside the physical universe, but rather are part of it, they can only be as precise as can be calculated from the total information content of the universe. The universe's information content is limited by its size, so just after the Big Bang, while the universe was still infinitesimally small, there may have been wiggle room, or imprecision, in the laws of nature.

And room for retrocausality. If it exists, the presence of conscious observers later in history could exert an influence on those first moments, shaping the laws of physics to be favorable for life. [SFG]

If the universe is fine-tuned at the big bang for life today, then it is useful to think of life as we know it today having caused that fine-tuning. That is, the 7 billion people on the Earth today caused the big bang to be tuned for a 7 billion population Earth. But if we think that is too many, then the sensible thing is to kill off about 90% of them right away. That will cause the big bang to be tuned differently, and a smaller population will seem to be the natural consequence of physical laws.

If you have moral objections to killing billions of people, then you should realize that your decision to raise those objections has only created a clone of yourself in a parallel universe who is in favor of the idea. The more you object, the more you insure that it actually happens in the parallel universe.

A truly enlightened moral philosophy would not just seek to reduce pain today here on Earth, but would apply a sense of social justice nondiscriminatorily to other times, places, and universes. Thus we should seek to reduce suffering in other parallel universes.

The simplest way to reduce such suffering is to go around making bad decisions. Each bad decision enables a clone in a parallel universe to make a good decision. While your bad decision might have bad consequences for you, you have voluntarily and generously accepted them, so that your clone and others will benefit in the alternate universe.

Conclusion

Our language, politics, and common sense attitudes have not caught up with modern physics and philosophy.

The whole methodology of science, from high energy physics to the soft sciences, is to model causality with mathematical equations and to attribute the discrepancies to randomness. Models with smaller random errors get higher praise. So of course the ideal world view is a mathematical determinism with random errors that are either zero or identified as irreducibly random.

Following those ideals to their logical consequences cause us to abandon hope for the future, and to focus on the past. The future is for the fools who believe that life has meaning and purpose.

References

- [Buz] Dark Buzz. <http://www.darkbuzz.com> (with list of clickable references)
- [Che] The Effect of Language on Economic Behavior: Evidence from Savings Rates, Health Behaviors, and Retirement Assets, M. Keith Chen, April, 2013. <http://www.anderson.ucla.edu/faculty/keith.chen/papers/LanguageWorkingPaper.pdf>
- [Coy] Does the average person believe in determinism, free will, and moral responsibility?, Jerry Coyne. <http://whyevolutionistrue.wordpress.com/2014/02/19/does-the-average-person-believe-in-determinism-free-will-and-moral-responsibility/>
- [Fey] Feynman Lectures on Physics, Vol III, Chap 2. http://www.feynmanlectures.caltech.edu/III_02.html#Ch2-S6
- [Har] Free Will, Sam Harris. <http://www.samharris.org/blog/item/reflections-on-free-will>
- [Llo] A Turing test for free will, Seth Lloyd, 2013. <http://arxiv.org/abs/1310.3225>
- [Moo] 7 Reasons Why It's Easier for Humans to Believe in God Than Evolution, Chris Mooney, Nov. 2013. <http://www.motherjones.com/politics/2013/11/seven-evolutionary-reasons-people-deny-evolution>
- [Mer] QBism as CBism: Solving the Problem of "the Now", N. David Mermin, Nov. 2013. <http://arxiv.org/abs/1312.7825>
- [NBC] Big Bang Theory: More Bangs May Be Coming (But They Won't Hurt), NBC News, March 20, 2014. <http://www.nbcnews.com/science/space/big-bang-theory-more-bangs-may-be-coming-they-wont-n58251>
- [Nic] Moral Responsibility and Determinism: The Cognitive Science of Folk Intuitions, Shaun Nichol. <http://dingo.sbs.arizona.edu/~snichols/Papers/moralresponsibilityFinal.pdf>
- [Phil] What Do Most Philosophers Believe?, Luke Muehlhauser, Dec. 8, 2009. <http://commonsenseatheism.com/?p=5552>
- [Pag] Sensible Quantum Mechanics: Are Only Perceptions Probabilistic?, Don N. Page <http://arxiv.org/abs/quant-ph/9506010>
- [Poi] Science and Hypothesis, Henri Poincaré, Chap. X, 1902. http://en.wikisource.org/wiki/Science_and_Hypothesis/PART_IV
- [Rus] Mysticism and Logic and Other Essays, IX. On the Notion of Cause, B. Russell. http://en.wikisource.org/wiki/Mysticism_and_Logic_and_Other_Essays/Chapter_09
- [Sch] Nature has no faithful mathematical representation, Roger Schlafly, FQXi 2012 essay contest. <http://fqxi.org/community/forum/topic/1283> The quantum does not reduce to discrete bits, FQXi 2013 essay contest. <http://fqxi.org/community/forum/topic/1828>
- [Sci] Is Time an Illusion? Scientific American, June 2010. <http://www.scientificamerican.com/article/is-time-an-illusion/>
- [SFG] Science hopes to change events that have already occurred, SF Chronicle (SFGate), Jan. 21, 2007. <http://www.sfgate.com/science/article/Science-hopes-to-change-events-that-have-already-2655518.php>