FAIRNESS IN TEACHING EVOLUTION IN PUBLIC SCHOOLS

Bryan Warnick
The Ohio State University

The controversy about the place of organic evolution in American public schools involves a number of different philosophical issues, including questions about the nature of science, religion, and political justice. In this article, I discuss not so much whether creationism should be taught in schools, but how evolution should be taught. If we are going to prohibit the teaching of something like Intelligent Design (ID) in science classrooms because it is unscientific, what implications does that then have for how we teach evolution? My goal is to uncover the most fair and consistent position.

The first question we need to ask before proceeding to is this: What is fairness and what does fairness demand with respect to the curriculum? One productive starting point for this discussion is John Rawls and his notion of "justice as fairness." In *Theory of Justice*, Rawls argues that fairness means being able to cooperate with one another under conditions of mutual respect and equality.[1] To better understand what Rawls means by mutual respect and equality, he asks us to visualize a situation in which individuals are debating the basic principles governing their society and are doing this behind what he calls a "veil of ignorance." This veil means that individuals are unaware of the social positions they occupy within the society they construct. This position, the "original position" as Rawls calls it, illustrates the conditions of fairness. No one is going to argue for privileging one contested belief system over another since one might find oneself outside of the privileged social position once the veil of ignorance is withdrawn. The device forces us to think about how we would feel if we were to occupy different social positions. In this position, we are better able to imagine a society that would be fair, whatever substantive (reasonable) beliefs one holds or whatever one's race, class, or gender.

This notion of fairness is not without controversy, of course, but it will serve as my entry point here.[2] Given this notion of fairness, what should we do with representations of different belief systems in the curriculum? What would we agree to under conditions of mutual respect and equality, in other words, in something like the original position? I can only defend here what I think is a relatively trivial answer to this question.[3] In the original position, I think we

[1] John Rawls, *A Theory of Justice* (Cambridge, MA: Belknap, 1971).

[2] To understand the complexity, see Alan Ryan, "Fairness and Philosophy," *Social Research* 73, no. 2 (2006): 597–606.

[3] A more detailed consideration of this question can be found in my "Evolution, Creationism, and Fairness: Equal Time in the Biology Classroom," *Philosophy of*

would agree that contested substantive beliefs should be given the same treatment in the schools *to the extent that they are the same*. If one substantive worldview is critically examined, they all should be critically examined; if one is left out, they all should be left out. Agents in the original position would accept this provision because their substantive views would receive equal treatment with all the others. They could not accept the privileging of one view in the original position over others because it is possible that they would not share that view. Contested worldviews, then, should be treated the same in public schools to the extent that they are the same.

Another starting point for my discussion, beyond this principle of fairness, will be the observation that both "evolution" and "creationism" are multifaceted theories. They are multifaceted in two senses. First, these are broad titles for a variety of very different views. With respect to evolution, one can be a Theistic Evolutionist, positing that species change has occurred over time while maintaining that such change is part of a divine plan. Or, one can support a more traditional Darwinian notion of evolution, where species change is the result of unguided random mutations and survival pressures, with the facts of evolution perhaps serving as evidence against divine design. At the same time, there are different ways of being a creationist. We have "Young-Earth Creationists" arguing that the Genesis seven-day account of creation is literally true and "Old-Earth Creationists" arguing that the concept of a seven-day creation should be taken metaphorically, acknowledging the reality of an older planet. We also have the Intelligent Design (ID) theorists who, like the Theistic Evolutionist, agree with the facts of species change over time, but argue that the "best explanation" for such change is that it is all guided by a divine force. The difference between the Theistic Evolution position and ID is that the ID proponents, like most other creationists, believe that divine design can be demonstrated scientifically.

The second way in which these views are multifaceted is that all of these positions are conglomerates of empirical observations, views on the nature of science, and metaphysical claims about the underlying nature of the universe (and the forces behind the universe, if any there be). These views are "comprehensive" in the sense that they are big and explanatorily ambitious, much like the Kuhnian notion of a paradigm. Some views of evolution and creation emphasize the metaphysical claims and underplay the empirical observations (like Young-Earth Creationists), but they are still conglomerate views in that there are empirical observations that are important to them. The fact that these views are complex conglomerates will matter because assessing whether a view is scientific or religious becomes more difficult: parts of one view might be more scientific while other parts may be less scientific. It will be

Education 2009, ed. Deborah Kerdeman (Urbana, IL: Philosophy of Education Society, 2009), 305.

important, then, that we "disaggregate" the theories. Theories may be more or less scientific depending on which of their various parts are emphasized.

Scientific Demarcation

The central idea behind this paper is, again, the moral and political idea of fairness: we should treat contested theories the same in public schools *to the extent that they are the same*. We need to ask, then, which theories are the same and which are different in order to apply the principle. Theories that are "scientific" should be treated equally with others that are scientific; non-science should be treated equally with non-science. Suppose we look at what is currently the most intellectually defensible form of creationism, Intelligent Design. If we are to exclude something like ID from science classrooms, saying that it is not "scientific," and if we claim that only "science" should be taught in science classrooms, fairness demands that we also ask whether the claims of the evolutionary theorists are themselves "scientific."

Now, we should certainly ask whether it is true that only science should be taught in science classrooms. This stipulation, it seems to me, is highly problematic. The "science only" view of science classrooms undercuts all forms of interdisciplinarity within the classroom, including attempts to combine science with history, literature, or art. It also removes the science classroom as a site of political education. This seems extreme and misguided. After all, couldn't citizenship education be a part of what is taught in the science classroom? If we grant that schools have a duty to teach citizenship as part of their larger mission, it seems that educators must attend (for example) to how students relate to each other as they have personal encounters throughout the school day. Science class would be a site for personal encounters just like any other class, and it would therefore also be a spot for citizenship education. It would be odd to say that science class is exempt from these larger political, civic, and moral goals.

I will return to this point at the end of the essay. Let us assume for now, though, that the only appropriate topic to discuss in a science classroom is what can be considered "scientific" according to our best notions of what constitutes science. This raises the obvious question: What makes science different from non-science? One influential statement about what constitutes science is found in the opinion of Justice John E. Jones in the *Kitzmiller v. Dover Area School District* (2005) decision.[4] The markers of demarcation that can be gleaned from this opinion are these:

(1) Science permits only natural explanations for observable phenomena.
(2) Scientific claims are subject to testing and falsification.

[4] Kitzmiller v. Dover Area School District. 400 F. Supp 2nd 707 (M.D. Pa. 2005).

(3) Science promotes an ongoing research program, often seen in cumulative, peer-reviewed publications from a community of practitioners.

I should point out that, in the history of science, one can find exceptions to nearly all of these demarcations. It is generally agreed in philosophy of science that there is no tidy solution to this "Problem of Demarcation," which involves the attempt to find essential differences between science and pseudo-science.[5] Still, it seems to me that some notion of rough demarcation is possible if we give up looking for a single, defining feature of science and look at multiple criteria. Theories can be more or less scientific as we rate them across different notions of demarcation. Theories that are scientific have more of a family resemblance among themselves rather than sharing exactly the same features. In what follows, I will use Justice Jones's criteria, bearing in mind that even legitimately scientific theories can do better or worse according to this pluralistic standard.

Science and Intelligent Design

To analyze fairness in science class, we should first acknowledge that there is much overlap of the biological and geological basics between the Darwinian Evolutionist and the ID theorists. This makes ID different from a Young-Earth Creationist position, for example, which takes issues with almost every part of science—geology, astronomy, genetics, paleontology, biochemistry, and so forth. In contrast to the Young-Earthers, ID proponents would agree with almost all the data and findings of the contemporary scientific enterprise. They would agree about such things as the age of the earth, carbon dating techniques, and genetics. They would not contest the findings of the fossil record. They would not contest the idea that hominids evolved from earlier species or even, necessarily, that all forms of life evolved from a common ancestor. They need not even deny, it seems to me, that species change occurs through genetic mutations coupled with survival pressures. A designer, after all, could activate his or her design through these "natural" mechanisms. Most of the current scientific curriculum relating to the biological development of life would be untouched if the ID theorists were in charge.

As I read things, there are two major differences between evolution and ID. First, the ID theorist will often argue that the regular rate of species changes, the normal rate of genetic mutations, is not sufficient to account for the complexity of organic structures in the observed species. In other words, the regular rates of mutations are highly unlikely to produce the complex structures we see in nature given a finite time sequence.[6] Many things, like

[5] Larry Laudan, "The Demise of the Demarcation Problem," in *Physics, Philosophy and Psychoanalysis: Essays in Honor of Adolf Grünbaum,* ed. Robert S. Cohen and R. Laudan (Dordrecht, Netherlands: D. Reidel, 1983), 111–127.

[6] See Micahel Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution*

eyesight, are a complex web of interlocking systems. The Darwinian says that small mutations give small advantages that, acting over a long enough time, are able to produce such complex systems.[7] For the ID proponent, the difficulty with that idea is that small changes would seem to offer no survival value until they arrive, step by step, at a stage of sufficient complexity—how does it help an organism's survival to have an inoperative mass of tissue, 5% of an eye? But if there is no survival value for the smaller mutations by themselves without the larger system, there is no mechanism to preserve or expand these small changes within the species population. For the ID proponent, the value depends precisely on the function of interlocking systems, with all the parts in place. There is no mechanism that preserves these small changes until they reach the necessary complexity. ID proponents argue the probability of such changes happening, changes in which a long sequence of DNA mutations happened over time, each supplying a survival advantage over others, is vanishingly small. This is their most interesting criticism of evolutionary theory. Notice that this is simply a negative claim against the proposed mechanisms of evolutionary theory, as it is currently understood. It makes no reference to a designer.

The second major difference is a disagreement about whether there is an ultimate cause *behind* nature directing such species change. Given the improbability of complex structures emerging through regular random mutations and survival pressures, ID theorists posit that there must be a higher force directing mutations toward complex structures. This is their positive claim: the best way to explain complex biological structures is to attribute them to a designer.

What happens if we disaggregate ID theory? What is scientific and what is not scientific? The negative claim, that regular rates of random mutations cannot be sufficient to develop complex biological systems, clearly seems to be a scientific claim. There is no positing of any super-natural forces, it is falsifiable (to the extent that probability claims can be falsified—a problem that falsificationist Karl Popper never seemed to deal with), and it is suggestive of future research projects. I don't see any way to argue that this is not a scientific position. It rates well on all the demarcations that Justice Jones described. Whether or not it is a successful scientific position is another matter, of course, and one I am not qualified to answer. But it clearly is within the realm of what science can investigate.

Behind this negative critique of evolution is a deeper debate about whether science can investigate the limits of science. Can there be a science that explores what science cannot explain? Some might claim that science

(New York: Free Press, 2006) and *The Edge of Evolution: The Search for the Limits of Darwinism* (New York: Free Press, 2008).

[7] For a discussion, see Francis Beckwith, *Law, Darwinism, and Public Education: The Establishment Clause and the Challenge of Intelligent Design* (Lanham, MD: Rowman & Littlefield, 2003), 110–112.

(operating with inherently superior naturalistic explanations) can disprove creationism in a way that creationism cannot disprove evolution. Creationism, by referencing the purposes of God or a Designer, cannot formulate reasons that "count" within science. So, ID makes claims that science simply cannot investigate. Thus, there is an asymmetry: evolution disproves creationism in a way that creationism cannot disprove evolution.

Thomas Nagel, a prominent contemporary philosopher and self-identified atheist, disagrees with this asymmetry. Suppose we grant that we have no "divine scientific psychology"—we do not know how God operates, if there is a God. This would indeed imply that the study of God (or the study of nature as a design of God) could not then be scientific. He then continues:

> But that does not imply that there cannot be scientific evidence for or against the intervention of such a non-law-governed cause in the natural order. . . . To ask whether there are limits to what can credibly be explained by a given type of scientific theory, or any theory relying only on universal physical laws, is itself a scientific question. An answer to the question that asserts such limits on the basis of empirical evidence is still a scientific claim, even if it also proposes an alternative cause whose internal operation is not governed by the kind of natural law that science can investigate. I suspect that the assumption that science can never provide evidence for the occurrence of something that cannot be scientifically explained is the principled reason for the belief that ID cannot be science; but so far as I can see, that assumption is without merit.[8]

Nagel says that, rather than disqualifying ID as non-science, we would be more consistent to think of these arguments as scientific and evaluate them on their merits. To be consistent, opponents of ID should think of ID as "bad" science rather than non-science, if that is what they believe.

Is Nagel right about this? I think he is only partly right. What science can do is to accumulate anomalies and undermine its current understanding, thereby allowing space for the belief in the supernatural if people are inclined to believe in the supernatural. Science can certainly accumulate evidence that something unexplained is going on—it may be possible to show that something is going on with ghosts or ESP that we don't understand. It is more problematic, though, to say that we can demonstrate scientifically the limits of science. The reason is that we can never tell the difference between our own ignorance of natural laws, on the one hand, and something happening that goes beyond natural laws, on the other. That is, we can never say that our lack of

[8] Thomas Nagel, "Public Education and Intelligent Design," *Philosophy & Public Affairs 36* (2008): 190.

understanding *proves* the existence of the supernatural because an alternative hypothesis exists, namely, that we simply don't understand nature as we thought we did. Both positions will always be open to us. Thus, science cannot distinguish its limits from its ignorance.

The second ID claim, the positive claim about demonstrating a designer from explanatory gaps in evolutionary theory, is therefore much more dubious as science. Indeed, it is the leap from unexplained complexity to the idea of purposeful design that sets the evolutionist rightly on edge. Even if it were true that our understanding of the rates of mutation is erroneous, why must scientists then conclude that a designer is behind it all? This is the famous "god of the gaps" objection to ID, where the ID proponent is criticized for simply filling our epistemological shortcomings with "God" or a "designer" as a lazy explanatory mechanism. Ignorance of natural mechanisms does not lead to the conclusion that no such mechanism exists. The ID proponents can rightly use science to point to what is unknown, and they can fill these holes with God if that is what they believe, but they should not pretend that those holes (by themselves) prove the existence of the designer.[9]

To the extent that ID proponents argue that biological complexity demonstrates a world of purpose and design, they are making a claim that is outside of science given the demarcations we have stipulated. In claiming that a force behind nature is the ultimate cause directing species change, they move beyond what science can speak to. Note that the designer hypothesis makes no predictions, by itself, about what the biological world would look like. Designs can be implemented for various purposes, after all, and each purpose might involve innumerable design possibilities. Telling us that the world was designed, *without also knowing the mind and intentions of the designer*, gives us no idea of what to expect to find, since the design could happen in many ways and for many different purposes. Since the fact of design does not tell us what to expect, it does not make predictions and falsifiable claims, nor does it suggest a future research program. To the extent, then, that a science teacher claims that the complexity of nature implies a force outside of nature, that teacher has moved outside of science.

Science and Evolution

Consider, however, a science teacher with the opposite approach—one who, like Richard Dawkins and Daniel Dennett, claims that evolutionary science disproves the designer hypothesis. Maybe this teacher has read Richard Dawkins's book, *The Blind Watchmaker*, with its subtitle, *How the Evidence of*

[9] The ID proponent may legitimately understand the gaps not as proof for the existence of God, but as a "claim about what is reasonable to believe about biological evolution if one independently holds a belief about God that is consistent both with the empirical facts about nature that have been established by observation." This is a very different position and one that is not predicated on a logical fallacy. See Nagel, "Public Education and Intelligent Design," 188.

Evolution Reveals a World Without Design. Maybe the teacher has read Dawkins's famous declaration:

> All appearances to the contrary, the only watchmaker in nature is the blind forces of physics, albeit deployed in a special way . . . Natural selection, the blind, unconscious automatic process that Darwin discovered, and we now know is the explanation for the existence and apparently purposeful forms of all life, has no purpose in mind. It has no mind and no mind's eye.[10]

Or maybe the teacher has heard the statement of biologist Jacque Monod that the natural world is "the product of an enormous lottery presided over by natural selection, blindly picking the rare winners from among the numbers drawn at random."[11] What should we think of the scientific status of this claim? Can science disprove the existence of a design? Or, same question, can science prove that the world is governed by purposeless laws or randomness?

The argument seems to be that, because evolution gives a possible explanation for the development of complex organisms, then the design hypothesis is false. If the Darwinist can show that the pathway to complex organisms is not astronomically improbable, then intelligent design is defeated. Countering the best argument for design, in other words, establishes that design did not happen.

Thomas Nagel again takes up the debate on this point. Nagel admits that evolutionists have suggested how species changes *could* happen, given enough time, but Nagel points out that "possibility" does not speak to the real issue of "probability."

> It is not enough to say, although it is true, that the *in*capacity of evolutionary mechanisms to account for the entire evolution of life has not been conclusively established . . . Those who offer empirical evidence for ID do not have to argue that a completely nonpurposive explanation is impossible, only that it is very unlikely, given the evidence available.[12]

He then denies that the evolutionists have shown that their account is probable. It seems unlikely to him that enough survival-granting mutations would occur given the time constraints of real natural history—at least not enough to explain

[10] Richard Dawkins, *The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design* (New York: Norton, 1996), 5.

[11] Jacques Monod, *Chance and Necessity: An Essay on the Natural Philosophy of Modern Biology* (New York: Knopf, 1971), 138.

[12] Nagel, "Public Education and Intelligent Design," 200.

complex organic structures. Similarly, noted analytic philosopher of religion Alvin Plantinga argues against Dawkins:

> At best [Dawkins] show[s], given a couple of assumptions, that it is not astronomically improbable that the living world was produced by unguided evolution and hence without design.
>
> But the argument form
>
> *p* is not astronomically improbable
> therefore
> *p*
>
> is a bit unprepossessing. If I announce to my wife, "I'm getting a $50,000 raise for next year!" Naturally she asks me why I think so. "Because the arguments for its being astronomically improbably fail! For all we know, it's not astronomically improbable![13]

For Plantinga, this type of argument hardly shows that evolution "reveals a world without design."

If Nagel and Plantinga have described the science correctly, then there is a real problem here for someone like Dawkins. Showing that it is theoretically possible that unguided selection led to complex organisms would not prove that it did. Thus, Dawkins argument, and evolutionary findings in general, do not demonstrate that the world is without design.

The key question in all of this is whether Nagel and Plantinga go far enough. We need to ask the following: What sort of observations would speak to the matter of whether the universe was "random" or "designed"? I have argued that the designer hypothesis offers no predictions about what observations to expect. It offers no research program. It deals with the metaphysical and supernatural. The same holds true, it seems to me, of the hypothesis that the universe is unplanned or random. Suppose a mutation occurs that offers some survival value. How could we tell if that mutation is "random" or "designed"? In general, how could we ever tell that any mutations leading to complex organisms were truly random or part of some plan? The proponent for design can always say that the designer simply chose this Darwinian sequence, and this particular set of environmental conditions and mutations, to accomplish its divine purposes. The Darwinian evolutionist can always deny this.

The reason for this impasse is that both claims are "metaphysical" and both lay outside of science.[14] Randomness and design are both claims about

[13] Alvin Plantinga, *Where the Conflict Really Lies: Science, Religion, and Naturalism* (New York: Oxford University Press, 2011), 25

[14] I do not want to endorse a simple positivism here. Metaphysical talk relating to unobservables will necessarily pervade science if science is going to make any sort of

what stands *behind* nature. Randomness, or the "lack of a designer" hypothesis, makes no predictions by itself about what the biological world will look like, and thus does not lend itself to an ongoing research program. Like the idea of a designer, metaphysical randomness gives us no idea what to expect—it is compatible with *any* set of empirical observations. To the extent that an evolutionist claims that "randomness" is a metaphysical reality, then, they are making a claim that goes beyond any possible evidence. The same rules we applied to ID would therefore apply here, too, and fairness demands we treat theories the same to the extent that they are the same. It would be inconsistent to say that the claim "God exists" is religious, but the claim "God doesn't exist" is not religious. Likewise it is inconsistent to say that the claim "the universe was designed" is unscientific, while the claim "the universe was not designed" is scientific. If a claim is fundamentally religious, then the denial of that claim would have to be religious, too.

Implications

It is important, then, that we "disaggregate" the theory of evolution as understood by some of its most strident proponents, like Dawkins. Some of the claims seem to be scientific, other claims less scientific and, in going beyond available evidence in positing metaphysical purposelessness, more akin to religion. This analysis highlights some of the distinctions that should made, particularly when it comes to legal matters. The courts have consistently ruled that evolution is not to be considered a form of religion. For example, in *Freiler v. Tangipahoa Parish Board of Education* (1997), a United States District Court ruled that a disclaimer read before lessons about evolution was unconstitutional, partly on the grounds that the disclaimer implied that evolution was a religious viewpoint among others.[15] Also, in *Peloza v. Capistrano School District* (1994), the Ninth Circuit held that requiring science teachers to teach evolution does not violate their right to the free exercise of religion because evolutionism is not to be considered a religion.[16]

Given my analysis, however, the courts should make some distinctions here. If by "religion" we mean a view that speaks of untestable, ultimate causes behind the universe, then some forms of evolution may indeed be similar to religion and therefore treated in a similar way. If a particular approach to evolution dictates that "randomness" is to be taught as an ultimate cause, for example, it would violate the First Amendment rights of teachers to mandate that this be taught. If by "evolution," though, we mean the idea that species evolved over time from common ancestors through mutations and survival

advances. There is a difference, though, between the sort of metaphysics that is necessary to formulate testable theories and the broad metaphysics that grounds a particular worldview.

[15] Freiler v. Tangipahoa Board of Education, 975 F.Supp. 819 (E.D. La. 1997).

[16] Peloza v. Capistrano Unified School District, 37 F.3d 517 (9th Cir. 1994).

pressures (whether random or guided), then it does not violate the rights of fundamentalist teachers, and it can be mandated that they teach evolution in this sense.

In the end, it seems clear that a science teacher cannot posit either "design" or "randomness" as an ultimate cause of species change if she is to be fair and consistent. The science teacher cannot claim that gaps in evolutionary understanding prove the existence of a designer, nor can she claim that evolutionary evidence proves the non-existence of a designer. Teachers who would be tempted to make ultimate claims about a fundamental cause, or lack thereof, behind natural change would simply be prohibited from doing so. More pointedly, a science teacher inspired by Dawkins cannot teach as true the claim that "Evolutionary evidence shows that everything is random, nothing designed."[17] If we are to insist that only science should be taught in science classrooms, it seems to me that teachers should say something like this: "In this class, we will talk about how species have changed over time and the forces that have driven such changes. Some people believe that these forces operate randomly and that there is no larger purpose beyond the evolution of species. Others believe that species change is driven by a divine purpose and design. We will not discuss either position, since we cannot demonstrate either position scientifically." This position, I believe, is characterized by an admirable intellectual humility. It also allows us to teach everything that is scientifically important about evolution and it does not demand that we teach Intelligent Design in order to be fair.

At the same time, I recognize that we may sometimes want a more robust debate in schools. My claim here is only about fairness. When these theories converge—as they do when they both make claims about what stands behind nature—they should be treated the same. Another way to be fair is to open science class to the philosophical debate about what lays behind nature, and give both sides a voice in that long and heated debate. If this path is taken, students could read both Dawkins and ID proponents like Michael Behe. This would be an exciting intellectual experience, perhaps, but it would mean that science class would need to go beyond science. As Nel Noddings has suggested,[18] perhaps we should start linking science and other school subjects to the larger intellectual world.

[17] This approach is similar to that which is endorsed in Segraves v. State of California, Sacramento Superior Court #278978 (1981). In this case, the Sacramento Superior Court upheld "antidogmatism" policy of the California State Board of Education. Schools should focus on the "how" of evolution and stay away from questions of "ultimate causes." If questions of ultimate causes come up, the matter should be treated conditionally.

[18] Nel Noddings, *Educating for Intelligent Belief or Unbelief* (New York: Teachers College Press, 1993).