

How Can We Know Intelligent Design is Science?

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Philosophers of science have long-debated the precise definition of science. In fact, current trends in philosophy of science eschew the use of demarcation criteria to distinguish between science and non-science. Philosopher Larry Laudan comments on the consensus of this field:

[T]here is no demarcation line between science and nonscience, or between science and pseudo-science, which would win assent from a majority of philosophers.¹

Despite these disagreements, it is possible to show that the theory of intelligent design (ID) qualifies as science. While the precise definition of science may be unclear, and the exact boundary between science and non-science blurry, most would agree there are certain qualities that clearly place some ideas on the side of science. One of those is the scientific method. If an idea uses the scientific method to make its claims, it's very likely that the idea is scientific. (See diagram at right, below.) Of course, an idea can be scientific, but also be wrong (e.g. ether theory, geocentrism, etc.).

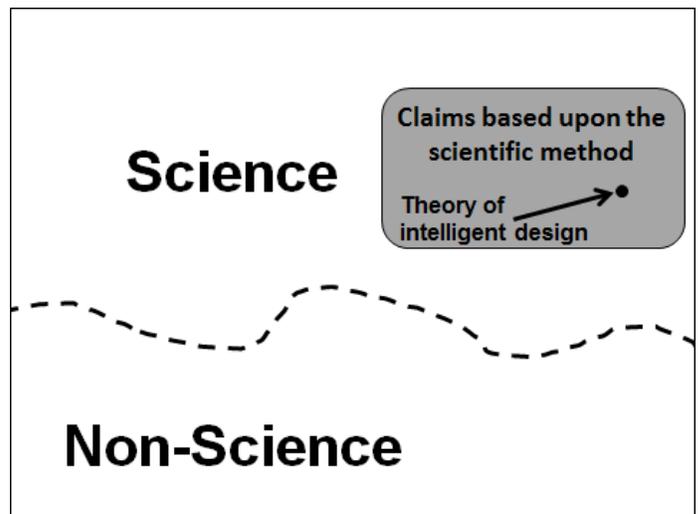
We can know ID is science because it uses the scientific method to make its claims. The scientific method is commonly described as a four-step process involving *observations*, *hypothesis*, *experiments*, and *conclusion*.

Observations: ID begins with *observations* that intelligent agents produce complex and specified information (CSI). (An event is complex if it is unlikely, and specified if it matches some independent pattern.)

Hypothesis: Next, design theorists *hypothesize* that if a natural object was designed, it will contain high levels of CSI.

Experiment: Scientists then perform *experimental tests* upon natural objects to determine if they contain complex and specified information. One easily testable form of CSI is irreducible complexity, which can be tested and discovered by experimentally reverse-engineering biological structures through genetic knockout experiments to determine if they require all of their parts to function. Mutational sensitivity tests can also be used to identify high CSI in proteins and other biological structures.

Conclusion: When experimental work uncovers irreducible complexity, or high CSI in biology, researchers *conclude* that such structures were designed. This is because, in our experience, intelligence is the only known cause of high CSI. As Stephen Meyer explains:



Our experience-based knowledge of information-flow confirms that systems with large amounts of specified complexity (especially codes and languages) invariably originate from an intelligent source—from a mind or personal agent.²

Of course like any scientific conclusion, this conclusion is held tentatively, subject to future discoveries and future investigations—investigations which ID encourages. But because ID is presently the best scientific explanation for structures with high CSI, it is entirely appropriate to infer design. In this way, ID uses the scientific method to make its claims.

Fallback Arguments

ID-critics often add two additional components to the scientific method in an effort to disqualify ID from being science: peer-review, and methodological naturalism. Neither criterion succeeds in disqualifying ID from being scientific.

Peer Review

ID-critics often charge that an idea can only count as science if it has been published in peer-reviewed journals. The argument holds that ID hasn't published in peer-reviewed scientific journals, and therefore isn't science. This criticism fails on both the theory and the facts.

Theory: Peer-review is irrelevant as a requirement of science. Stephen Jay Gould and other scientists eloquently affirmed this when they wrote:

The quality of a scientific approach or opinion depends on the strength of its factual premises and on the depth and consistency of its reasoning, not on its appearance in a particular journal or on its popularity among other scientists.³

Indeed, if a concept had to be peer-reviewed to be scientific, science could never progress, for every new idea began as an unpublished, minority opinion. For this reason, the U.S. Supreme Court ruled that peer-review “does not necessarily correlate with reliability, and in some instances well-grounded but innovative theories will not have been published.”⁴

Indeed, the peer-review system has often rejected ideas and research that turned out to be correct. Historian of science Juan Miguel Campanario has documented numerous instances where top journals rejected significant scientific papers, including a case where *Nature* rejected research that later earned the Nobel Prize in Physiology or Medicine.⁵

Facts: This criticism of ID is false. There are many pro-ID scientific papers published by ID proponents in peer-reviewed scientific journals, including *Journal of Molecular Biology*, *Protein Science*, *The Quarterly Review of Biology*, *Theoretical Biology and Medical Modelling*, *Journal of Advanced Computational Intelligence and Intelligent Informatics*, *Physics of Life Reviews*, *Cell Biology International*, *BIO-Complexity*, *Rivista di Biologia/Biology Forum*, *Proceedings of the Biological Society of Washington*, and *Annual Review of Genetics*. In 2011, the ID movement published its 50th peer-reviewed scientific paper.⁶

Methodological Naturalism

Critics often maintain ID isn't science because science must conform to methodological naturalism (MN). MN requires that whether or not the supernatural exists, we must pretend that it doesn't when practicing science. This idea was expressed in a letter to the editor in *Nature*: "Even if all the data point to an intelligent designer, such an hypothesis is excluded from science because it is not naturalistic."⁷ Philosophers would disagree on whether MN is a requirement of science, but even if it is, there are good reasons why ID offends neither the letter nor the spirit of this "rule."

ID Doesn't Violate the Letter of MN: ID does not appeal to the supernatural, and thus does not require non-natural causes. As we saw earlier, ID begins with observations of the types of information and complexity produced by intelligent agents. Intelligent agents are natural causes that we can understand by studying the world around us. This makes intelligent agency a proper subject of scientific study. When ID finds high levels of CSI in nature, the most it can infer is that intelligence was at work. Because ID respects the limits of scientific inquiry, it does not make claims beyond the data by trying to identify the designer. Stephen Meyer explains:

Though the designing agent responsible for life may well have been an omnipotent deity, the theory of intelligent design does not claim to be able to determine that. Because the inference to design depends upon our uniform experience of cause and effect in this world, the theory cannot determine whether or not the designing intelligence putatively responsible for life has powers beyond those on display in our experience. Nor can the theory of intelligent design determine whether the intelligent agent responsible for information life acted from the natural or the "supernatural" realm. Instead, the theory of intelligent design merely claims to detect the action of some intelligent cause (with power, at least, equivalent to those we know from experience) and affirms this because we know from experience that only conscious, intelligent agents produce large amounts of specified information.⁸

Many other ID proponents have pointed out that ID only appeals to intelligent causes, not supernatural ones.⁹ Michael Behe writes, "as regards the identity of the designer, modern ID theory happily echoes Isaac Newton's phrase *hypothesis non fingo*."¹⁰ William Dembski explains: "Supernatural explanations invoke miracles and therefore are not properly part of science. Explanations that call on intelligent causes require no miracles but cannot be reduced to materialistic explanations."¹¹ Likewise, an early ID textbook affirms MN, stating: "intelligence . . . can be recognized by uniform sensory experience, and the supernatural . . . cannot."¹²

Some claim ID violates MN by leaving open the possibility of a supernatural designer. But ID does *not* claim to scientifically detect a supernatural creator. Again, the most ID infers is intelligent causation. Many (though not all) ID proponents may believe the designer is God, but they do not claim this is a scientific conclusion of ID. This makes ID no different from Darwinian evolution, which claims that if there is a supernatural creator, that would be beyond science's power to detect.

ID Doesn't Offend the Spirit of MN: Proponents of MN often justify this rule by arguing that it ensures that science uses only testable, predictable, and reliable explanations.¹³ However, as we have seen, intelligent design generates testable hypotheses based upon our knowledge of how the world works, and can be reliably inferred through the scientific method. In this way, intelligent

design does not violate any mandates of predictability, testability, or reliability laid down for science by MN. In fact, ID and neo-Darwinian evolution are methodologically equivalent.

Methodological Equivalence

Historical sciences like Darwinian evolution and intelligent design rely on the principle of uniformitarianism, which holds that “the present is the key to the past.” Under this methodology, scientists study causes at work in the present-day world in order, as geologist Charles Lyell put it, to “explain the former changes of the Earth's surface by reference to causes now in operation.”

Darwinian evolution applies this method by studying causes like mutation and selection in order to recognize their causal abilities and effects in the world at present. Darwinian scientists then try to explain the historical record in terms of those causes, seeking to recognize the known effects of mutation and selection in the historical record.

Intelligent design applies this same method by studying causes like intelligence in order to recognize its causal abilities and effects in the present-day world. ID theorists are interested in understanding the information-generative powers of intelligent agents. ID theorists then try to explain the historical record by including appeals to that cause, seeking to recognize the known effects of intelligent design in the historical record.

So whether we appeal to materialistic causes like mutation and selection, or non-material causes like intelligent design, we are using the same basic uniformitarian reasoning that is well-accepted in historical sciences.

ID and neo-Darwinism are thus methodologically equivalent. There is no non-arbitrary definition of science that can exclude ID, and not also exclude neo-Darwinism from being scientific. In the same way, any non-arbitrary definition of science that includes neo-Darwinism will also qualify ID as science. Critics may disagree with the conclusions of ID, but they cannot reasonably claim that it uses faith, divine revelation, or other non-scientific methods to make its claims. ID uses the scientific method to make its claims, and as such is science.

Is Intelligent Design a Scientific “Theory”?

A final common question is whether ID is a “scientific theory.” The word “theory” gets tossed around a lot as if everyone agrees on what it means. To answer the question, we must first consider the definition of “theory.”

Philosopher Peter Kosso explains that calling something a “theory” says little about the degree of certainty backing the idea. As he states, “neither ‘theoretical’ nor ‘law’ is about being true or false, or about being well-tested or speculative.” In his view, a theory “describes aspects of nature that are beyond (or beneath) what we can observe, aspects that can be used to explain what we observe.” Thus “[s]ome theories are true (atomic theory), some are false (caloric theory), and the scientific method is what directs us in deciding which are which.”¹⁴ Thus, in his view, a “theory” is defined by the epistemological basis of an idea—i.e., whether it makes use of the scientific method—not whether the scientific method has shown that idea true or false. Does ID meet this definition of theory? Yes, it does.

ID is a theory of design detection, and it proposes intelligent agency as a mechanism causing biological change. ID allows us to explain how aspects of observed biological complexity, and other natural complexity, arose. And ID uses the scientific method to make its claims.

As noted, the scientific method is commonly described as a four-step process involving observations, hypothesis, experiments, and conclusion. ID begins with the observation that intelligent agents produce complex and specified information (CSI). Design theorists hypothesize that if a natural object was designed, it will contain high levels of CSI. Scientists then perform experimental tests upon natural objects to determine if they contain complex and specified information. One easily testable form of CSI is irreducible complexity, which can be tested for by reverse-engineering biological structures through genetic knockout experiments to determine if they require all of their parts to function. When scientists experimentally uncover irreducible complexity in a biological structure, they conclude that it was designed.

ID Meets the Definition of “Theory” from ID’s Most Eminent Scientific Critics

As noted, there are many definitions of “theory” out there. How can we know if ID is a scientific theory? One way to know is to take the definition of “theory” given by ID’s most eminent scientific critics, and if ID meets that definition then there’s a good bet ID may properly be considered a scientific theory.

Perhaps the most eminent scientific opponents of the theory of intelligent design can be found among the membership of the U.S. National Academy of Sciences (NAS). In contrast to Kosso, the NAS defines “theory” as an idea that is well-tested and well-supported by the scientific evidence:

- “a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, and tested hypotheses”¹⁵
- “a comprehensive explanation of some aspect of nature that is supported by a vast body of evidence”¹⁶

If we accept the NAS's more stringent definition of theory, ID more than qualifies.

When dealing with multipart tests, it’s often useful to break the test down into its individual elements. If the subject meets all the “elements,” then it passes the test. The following elements are found in the NAS’s definitions of “theory”:

- **Element 1:** ID must be an “explanation of some aspect of the natural world” and a “comprehensive explanation of some aspect of nature.”
- **Element 2:** ID must “incorporate many facts, laws and tested hypotheses.”
- **Element 3:** ID must be “well-substantiated” and “supported by a vast body of evidence.”

Let’s briefly analyze whether ID meets these three elements.

Element 1: ID is an “explanation of some aspect of the natural world” and a “comprehensive explanation of some aspect of nature.”

ID is not merely an explanation of “*some* aspect of the natural world”—in fact ID explains *many* aspects of the natural world. If we think in terms of just broad categories, ID proposes that intelligent agency is the best explanation for historical events related to origins including:

- the origin of the fine-tuning of the cosmos for advanced life.
- the origin of extremely high levels of complex and specified information in DNA.
- the origin of integrated systems required for animal body plans.
- the origin of many irreducibly complex systems found in living organisms.

Because ID attempts to explain of many aspects of the natural world, especially many aspects of biological complexity, it satisfies this element.

Element 2: ID “incorporates many facts, laws and tested hypotheses.”

ID also meets this element because ID incorporates many facts, laws, and tested hypotheses, including:

- ID incorporates the known laws and constants of the universe and ties them together in a unified theory to explain why they are tightly coordinated and finely-tuned to match life-friendly parameters.
- ID incorporates many known facts about DNA sequences, as well as tested hypotheses showing they are finely tuned to perform biological functions.
- ID incorporates a myriad of tested hypotheses about the geologically abrupt appearance of body plans in the fossil record, as well as numerous facts from biochemistry and animal biology regarding the kind and amount of integrated information necessary to coordinate new types of proteins, cell types, tissues, and organs into new functional body plans.
- ID incorporates many tested hypotheses about the presence of irreducible complexity in biological systems, evidenced by genetic knockout experiments which have shown that irreducible complexity is a real phenomenon.
- ID does all of this by proposing new laws such as the law of conservation of information, new principles about the causes of high CSI, new methods of measuring functional information and complexity, and new hypotheses about the ubiquity of fine-tuning throughout both cosmology and biology.

Element 3: ID is “well-substantiated” and “supported by a vast body of evidence.”

This element is unique because it places “theory” in the eye of the beholder. If one thinks ID is correct (i.e., “well-substantiated” and “supported”), then it will qualify as a scientific theory. If one thinks ID is false, then you won't think it's well substantiated, and ID won't qualify as a theory. In practice, this element thus measures subjective questions about what people believe about an idea rather than posing objective questions about the basic nature of the idea being considered. This is probably why careful thinkers like Peter Kosso expressly exclude this subjective and somewhat contrived element from their definition of “theory.”

Nonetheless, a strong argument can be made that ID meets the NAS's third element, and a vast body of evidence can certainly be shown to back intelligent design. ID is well substantiated because a significant number of studies have confirmed ID's predictions, such as:

- Studies of physics and cosmology continue to uncover deeper and deeper levels of fine-tuning. Many examples could be given, but this one is striking: the initial entropy of the universe must have been fine-tuned to within 1 part in $10^{10^{123}}$ to render the universe life-friendly.¹⁷ That blows other fine-tuning constants away. New cosmological theories like string theory or multiverse theories just push back questions about fine-tuning, and exacerbate the need for fine-tuning.
- Mutational sensitivity tests increasingly show that DNA sequences are highly fine-tuned to generate functional proteins and perform other biological functions.¹⁸
- Studies of epigenetics and systems biology are revealing more and more how integrated organisms are, from biochemistry to macrobiology, and showing incredible finely-tuning in basic cellular functions.
- Genetic knockout experiments are showing irreducible complexity, such as in the flagellum, or multi-mutation features where many simultaneous mutations would be necessary to gain an advantage.¹⁹ This is fine-tuning within biology.

ID is supported by a vast body of evidence ranging from physics and cosmology to biochemistry to animal biology to systems biology to epigenetics and paleontology. ID more than exceeds the NAS's definitions of "scientific theory."

¹ Larry Laudan, *Beyond Positivism and Relativism: Theory, Method, and Evidence*, p. 210 (Westview Press 1996).

² Stephen C. Meyer, "The origin of biological information and the higher taxonomic categories," *Proceedings of the Biological Society of Washington*, 117(2):213-239 (2004).

³ Brief *Amici Curiae* of Physicians, Scientists, and Historians of Science in Support of Petitioners, *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

⁴ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 593-94 (1993).

⁵ See Juan Miguel Campanario, "On Influential Books and Journal Articles Initially Rejected Because of Negative Referees' Evaluations," *Science Communication*, 16(3):304-325 (March, 1995); Juan Miguel Campanario, "Not in our Nature," *Nature*, 361:488 (Feb. 11, 1993).

⁶ See "Peer-Reviewed & Peer-Edited Scientific Publications Supporting the Theory of Intelligent Design (Annotated)," at <http://www.discovery.org/id/peer-review/>

⁷ Scott C. Todd, "A view from Kansas on that evolution debate," *Nature*, Vol. 401:423 (Sept. 30, 1999).

⁸ Stephen C. Meyer, *Signature in the Cell*, pp. 428-429 (HarperOne, 2009).

⁹ For a discussion, see Casey Luskin, "ID Does Not Address Religious Claims About the Supernatural," *OpposingViews.com* (September 8, 2008), at <http://www.discovery.org/a/7501>

¹⁰ Michael Behe, "The Modern Intelligent Design Hypothesis," *Philosophia Christi*, 2 (3): 165 (2001).

¹¹ William Dembski and Jonathan Wells, *The Design of Life: Discovering Signs of Intelligence in Biological Systems*, pp. 13-14 (FTE, 2008).

¹² Percival Davis and Dean H. Kenyon, *Of Pandas and People*, p. 126 (FTE, 1993).

¹³ For example, see John A. Moore, *Science as a Way of Knowing* (Harvard University Press, 1993); Eugenie C. Scott, "Monkey Business," *The Sciences, New York Academy of Sciences*, 36(1):20-25 (Jan. / Feb. 1996).

¹⁴ Peter Kosso, "A Summary of the Scientific Method" *SpringerBriefs in Philosophy* (Springer, 2011).

¹⁵ *Science & Creationism: A View from the National Academy of Sciences* (National Academy Press, 1999), 2.

¹⁶ *Science, Evolution & Creationism* (National Academy Press, 2008), 11.

¹⁷ Roger Penrose and Martin Gardner, *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics* (Oxford: Oxford University Press, 2002), 444-445; Robin Collins, "God, Design, and Fine-Tuning," in *God Matters: Readings in the Philosophy of Religion*, eds. Raymond Martin and Christopher Bernard (New York: Longman Press, 2002), 122.

¹⁸ D. D. Axe, "Extreme Functional Sensitivity to Conservative Amino Acid Changes on Enzyme Exteriors," *Journal of Molecular Biology*, 301:585-595 (2000); D. D. Axe, "Estimating the Prevalence of Protein Sequences Adopting Functional Enzyme Folds," *Journal of Molecular Biology*, 1-21 (2004).

¹⁹ Transcript of testimony of Scott Minnich, *Kitzmiller et al. v. Dover Area School Board* (M.D. Pa., PM Testimony, November 3, 2005), 103-112. See also Table 1 in R. M. Macnab, "Flagella," in *Escherichia Coli and Salmonella Typhimurium: Cellular and Molecular Biology Vol. 1*, eds. F. C. Neidhardt, J. L. Ingraham, K. B. Low, B. Magasanik, M. Schaechter, and H. E. Umbarger (Washington D.C.: American Society for Microbiology, 1987), 73-74.