FAQ:
Some things appear "unintelligently designed" or are poorly designed. Is ID falsified by "sub-optimal design"?

> **The Short Answer:** Something could be designed even if it does not work with 100% energetic efficiency. Purposefully energetically inefficient designs aside, natural design constraints often require some aspects of design to not work at 100% optimal efficiency. Have you ever driven a Ford Pinto? This is thus a philosophical or theological objection about final causes along the lines of the age old "problem of evil." It thus requires a theological answer. Religion provides theological answers to the problem of evil or suffering. But these answers are not necessary for the scientific theory of intelligent design to be unscathed by the existence of "sub-optimal design."

The Long Answer:

In science, theories are confirmed or disconfirmed comparing the data to predictions that the theory makes.   A prediction of a scientific theory must be generally true for the theory under all circumstances, such that it can be confirmed through repeated experimentation by any scientist. In intelligent design theory, some claims about what designers produce are true in all circumstances, but some are not. In other words, there are some characteristics of designers which are universal among all possible intelligent agents, and some characteristics which are particular to only a subset of intelligent agents. Although it is clear that specified complexity is always the product of design, because designers may act with intentions unknown to us, it can sometimes be difficult to make broad scientific claims about what a designer would or would not produce in all situations. Such non-universal claims about what a designer would or would *not* create something enter us into the realm of theology and philosophy. To assess whether a claim about a designer is philosophical or scientific, we must turn to philosophy.

The Greek philosopher Aristotle realized that we can explain the origin of any object or entity through various "levels" of causation.   Often called Aristotle's "four causes," these ideas have been the bedrock of introductory philosophy courses for the past 2000 years. A brief look at these four causes will help show how they are relevant to this discussion.

Final Cause: Final causes are the ultimate purpose for the existence of something. The final cause asks "what is a thing's meaning or reason for existence in the grand scope of reality?" For example, if we ask, "why are there chairs?" the final cause would be "because people need something to sit in." In the case of chairs, their final cause is not necessarily moral or religious, however final causes very often are of a moral or religious nature. For example, if you ask a Christian, "Why do humans exist?," the traditional answer is "To know God personally and glorify Him." Final causes thus can have strong moral and religious implications, as they tend to account for a metaphysical reason for existence.

Efficient Cause: The efficient cause is the mechanism or method by which something is created—the "how." Returning to the chair example, the efficient cause of a chair might be a woodworker. The efficient cause has great importance in the intelligent design - evolution debate, which is essentially a debate over the efficient cause of life—"*how* did life arise?" Evolutionists, even theistic evolutionists, would claim that our efficient cause is the Darwinian mechanism--mutation and selection. In contrast, design theorists claim our efficient cause is some combination of intelligent design and evolution (microevolution). Questions about the efficient cause thus look to universal predictions of the two theories which allow us to determine which mechanism was involved in the production of a biological structure.

Formal and Material Cause: These lower levels of causation are less important here. Formal causes ask about the pattern, essence, or physical structure of a thing. The formal cause of a chair is the shape into which it is made so people can sit in it. The formal cause of a human is more complicated, and would include our physical, mental, emotional, and spiritual construction. A material cause is the physical matter from which a thing is made. Thus, the material cause of a chair could be wood, or plastic. More specifically, it could be atoms and molecules. A human's material cause would be cells, proteins, and biomolecules, etc.

In assessing the claim "a designer wouldn't design…" we must determine a claim is against a final cause or an efficient cause. Objections to final causes, the moral or religious reason something exists, lie outside of the realm of science. These theological objections can be answered through theological explanations, and are not relevant questions for the science of intelligent design. However, some objections could deal with the efficient cause. Let's try to distinguish between the two.

Type of Cause	Nature of Cause	Type of Objection to ID
Final Cause	Moral or religious reason for the existence of a thing.	Theological.
Efficient Cause	The mechanism or method by which a thing is created.	Scientific -- here you are trying to discriminate between design and evolution.
Formal Cause	Essence, structure, or building design of a thing.	N/A
Material Cause	The matter of which a thing is composed.	N/A

Distinguishing between "Final" and "Efficient" Objections to Design
At the Hillsdale College intelligent design debate, Darwinist philosopher Michael Ruse objected to intelligent design because he claimed a designer would not create people with the disease sickle-cell anemia. Others have objected that a designer would not create things like viruses (or perhaps one might include "Type III Secretory Systems"), which are designed to kill. In fact, Many early evolutionists promoted their theory not necessarily through scientific evidence for evolution, but rather through negative theological claims of what God would or would not have created. One such example comes from Darwin himself, who wrote:

> I cannot persuade myself that a beneficent and omnipotent God would have designedly created the Ichneumonidae [a large family of parasitic wasps] with the express intention of their feeding within the living bodies of caterpillars.

A variation of this method of argumentation is also exemplified by noted evolutionist paleontologist, the late Stephen J. Gould, who argues that we wouldn't have such an 'ugly' or 'inelegant' design:

> Orchids manufacture their intricate devices from the common components of ordinary flowers, parts usually fitted for very different functions. If God had designed a beautiful machine to reflect his wisdom and power, surely he would not have used a collection of parts generally fashioned for other purposes. Orchids were not made by an ideal engineer; they are jury-rigged from a limited set of available components. Thus, they must have evolved from ordinary flowers. (Stephen J. Gould)

Such arguments are based upon the *personal views* of these evolutionists, and are theological, rather than scientific. At first glance, this appears a moral objection, saying that morally speaking, a designer would not create people with diseases, pain, death, etc. Such an objection would be a clear example of the "problem of evil" objection. This age-old objection states that a kind, loving, all-powerful God would not create a world with disease, pain, and other evil characteristics (such as red lights and

moldy bread). This is clearly an objection that deals with the final cause, as it asks, "why, in the moral sense, would a designer create?"

The science of intelligent design theory quickly disposes with such moral objections through the simple observation that even things with an evil moral purpose can be intelligently designed. Torture chambers and electric chairs, terrible as they may be, are full complex specified information. Though some designers do not create evil, such as the God of the Bible, such a claim is not true for all designers in general, and thus does not attack the scientific theory of intelligent design. This shows how questions about final causes are not typically applicable to the science of intelligent design theory, because designers can create for a variety of different metaphysical reasons, though their products are still designed. Having addressed the scientific issue, such theological objections still beg for theological answers.

Most religions attempt to provide solutions to the problem of evil at some level. Volumes have been written by religious commentators on this subject, as coping with evil is a fundamental struggle with which all human beings must contend. We all lose loved ones, we all experience pain and loss. In writing an intellectual explanation for the "problem of evil" Christian author C.S. Lewis prefaced his discussion saying:

> [T]he only purpose of the book is to solve the intellectual problem raised by suffering; for the far higher task of teaching forgiveness and patience I was never fool enough to suppose myself qualified, nor have I anything to offer my readers except my conviction that when pain is to be borne, a little courage helps more than knowledge, a little human sympathy more than much courage, and the least tincture of the love of God more than all.

Lewis drives at the crucial human element involved in all discussions of the "problem of evil," but there is still the intellectual side. Harsh though it may seem, many philosophers believe there is no logical conflict between believing in an all-powerful and all-loving God and accepting the existence of evil in the world. Famous Oxford philosopher Richard Swinburne wrote, "It seems to be generally agreed by atheists as well as theists that what is called 'the logical problem of evil' has been eliminated, and all that remains is 'the evidential problem.'" In other words, the problem can be solved, but it is sometimes difficult to accept.

Christianity solves the "problem" by explaining that evil is ultimately not the fault of God, but rather is the result of human sin and the sin of evil spiritual beings. Both groups have rebelled against God, who is fundamentally loving and good. God thus did not create the physical or spiritual world full of evil, but His creations, in their own free will, chose evil. Additionally, though the world chose evil, Christianity teaches that God has redeemed it from evil. An analogy is that humanity was on a boat with God, and it was safe, dry, and happy. Humanity chose to jump off the boat into the swirling ocean, incurring the consequence of imminent drowning. Yet, while drowning in this ocean of evil, God in His mercy has thrown us a life-ring, Jesus Christ, if we choose to grab on to him. This is the essence of the Christian solution to the problem of evil.

Though it is easy to dispense with moral objections such as the one made by Ruse, there is another form that is less blatantly theological. Ruse objected that God would not create disease. While Ruse may have been arguing that God would not morally create the evils of disease, another possibility is that Ruse is simply claiming that as far as designing an organism is concerned, it is sub-optimal design to produce something that easily might die. Thus, Ruse might say, we would not expect any designer to create something which functions below the optimal level. This objection hits closer to the efficient cause, because a firm statement can be made that designers tend to create things that are

functional. A similar objection was made by Stephen J. Gould, saying that the "panda's thumb" is poorly designed to grasp the bamboo upon which pandas feed. Phillip Johnson describes the crux of such arguments:

> 'The Panda's Thumb,' relies on a few selected examples and a spectacularly shallow theology to establish the 'fact of evolution' ... Gould thinks that a supernatural designer could have found a more elegant solution to the panda's need for an efficient bamboo stripping tool; therefore the thumb is not designed; therefore it is the product of evolution.

Johnson points out that even when arguing the design is "sub-optimal" (some call it "unintelligent design") one is still making a theological objection about the intention of the designer, and assuming that a designer must create something with 100% energetically efficiency. This objection is also theological because all designers may not intend for all aspects of their designs to perform at the highest possible levels. My state-of-the art laptop must recharge its batteries once every 3 hours. I'd like it to never need recharging. Heck, I'd like to be able to type 2000 words per minute, fly like a bird, and be able to have fried-egg sandwiches every day without having to fear a heart attack. But just because I could have been designed to do certain things "better" or more energetically efficient does not mean that I was not designed to perform the functions I can perform. Once again, this issue has boiled down to the "problem-of-evil" argument stating that an all-knowing, all-loving, all-powerful God (i.e. the Designer) cannot coexist with evil (i.e. sub-optimalities). This is a theological objection, for such "flaws" or "imperfections" may ultimately have moral causes (remember the Biblical cause of evil in the world). However this objection can be resolved scientifically by showing that engineers are often forced into compromises in functionality when designing, and that they do not always have pure energetic efficiency in mind when they design.

Every engineer realizes that when designing a machine, one must act within design constraints. Sometimes one aspect of the functionality of a machine must be compromised in order to allow for another more crucial design parameter to be met. The final result is a machine that has overall optimal design, though perhaps functioning at a lower than possible level of performance with regards to some particular aspect of functionality.

At the scientific level, "sub-optimal design" can also be explained because designers may not intend for certain aspects of the design to operate at 100% energetic efficiency. This objection really gets at the final cause of why in the grand sense something is the way it is. Operating at less than 100% energetic efficiency does not address the question of the efficient cause, because there are many plausible reasons for why intelligent design might produce less than 100% optimal functionality with regards to all aspects of performance. Finally, this really is no different from the problem of evil objection. All one is really objecting to is the pain or deficiencies (i.e. evil) caused by the design, and assumes that the designer must never allow for such deficiencies. Indeed, genetics has revealed that we are even programmed to die! Indeed, unfortunately, many individuals with many diseases face a shortened lifespans. Does that mean we were not designed? Perhaps we were intelligently designed to die because it was not a part of the designer's final reason for creating us that we should live in these physical bodies forever. One might think that the designer is therefore cruel, but remembering that this is a theological issue, it can be pointed out that Christianity explains how "evil" in the world is ultimately not the fault of God. Objections pointing out "sub-optimalities" do not address the scientific question of evolution vs. design. Something can be sub-optimal, and yet be designed. Ever driven a Pinto?

Only questions about the "efficient cause" (i.e. the mechanism) which produced the design are relevant to the scientific inquiry of intelligent design theory.