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WHY “INTELLIGENT DESIGN” IS MORE INTERESTING THAN OLD-FASHIONED CREATIONISM

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ABSTRACT

“Intelligent Design” (ID) creationism largely relies on long-discredited forms of argument to try and make a case against naturalistic evolution. However, it also includes some novel elements, such as William Dembski’s claim to rigorously identify a reliable signature of intelligent design and thereby establish ID as an independent form of explanation not reducible to “chance and necessity.” Such arguments also fail; indeed, intelligence itself appears to be a product of combinations of chance and necessity, where Darwinian processes are critically important in producing genuine novelty. Addressing the scientific mistakes of ID creationism requires attention to current science about intelligence, complexity, and information; it must be a collaborative effort between biologists, physicists, computer scientists and others.

Keywords: intelligent design, creationism, artificial intelligence, randomness

When the Intelligent Design (ID) movement attracts the attention of mainstream scientists, it does so as the latest incarnation of creationism. The ID literature reinforces this impression. ID proponents devote most of their efforts to denouncing “Darwinism,” by which they mean naturalistic theories of evolution. Some ID proponents accept common descent, some do not. But the ID movement is united in thinking that mindless mechanisms – Darwinian variation-and-selection in particular – cannot account for the diversity and complexity of life.

If ID was only a collection of neocreationist claims concerning biology, it would be relatively straightforward to address. For example, the most prominent biology-related argument for ID has been due to biochemist Michael Behe (1), who claimed that certain molecular machines were “irreducibly complex.” Structures such as the bacterial flagellum, he argued, could not be assembled gradually through a series of functional intermediate forms – all of their many components had to come together at once. Critics immediately pointed out that systems and their components need not have had the same functions throughout their history. Indeed, Behe has lately shifted his emphasis away from his original argument.

Instead, Behe and other ID proponents’ current arguments for design in biology describe the interlocking complexity of biochemical systems and

state that it is implausible that they could have been assembled gradually. They then say that “Darwinists” have to supply a fully-articulated sequence of successive changes; otherwise Darwinian evolution can be dismissed as mere speculation (2). Such attempts at shifting the burden of proof do not impress many scientists. Though incomplete, evidence that, for example, eubacterial flagella are related to and have evolved as secretory mechanisms (3) is compelling. Biologists need to update their responses to creationism, addressing old arguments that have now been cast in a biochemical idiom, but otherwise ID presents no challenge to biology.

Then there is ID and physical science. Unlike the biblically literalist champions of Young Earth Creationism, ID proponents tend to accept an old universe or take no position on the matter of age. Nevertheless, ID includes physical claims as well. Their main concern is identifying supposed mysteries such as fine-tuning in astronomy and physical cosmology and proclaiming these as evidence of design (4). Though fine-tuning arguments have found favor among some theological liberals as well as in ID, they appear to be useless in terms of advancing science (5). So again, if all ID did was to retool old-fashioned intuitions about divine design, the scientific response to ID would not need to extend beyond adapting standard responses to creationism. There would be little of intellectual interest in criticizing ID.

However, though the bulk of ID literature is devoted to recycling old errors, there are some aspects of ID that are more interesting mistakes – where figuring out exactly how ID goes wrong can help us advance our knowledge and understand evolution better. One area where ID gets interesting is in its claims about intelligence.

ID proponents have vigorously engaged in philosophical debates about whether naturalistic explanations are required in science. They find methodological naturalism to be an unjustified constraint on our ways of investigating the world. They would like, ultimately, to introduce intelligent agents as a fundamental cause in scientific explanations. This seems reasonable enough; after all, sciences such as archaeology explain many of their findings by human agency. However, ID claims much more than an ability to identify the work of agents about which plenty is known independently (6). Human and animal intelligence can plausibly be seen to be part of the natural world. ID is fundamentally revolutionary point of view only if intelligent agency is somehow beyond natural mechanisms.

To flesh out such ideas, ID thinkers observe that today’s natural scientific explanations only make use of randomness and of lawful, patterned events – in biologist Jacques Monod’s terms, “chance and necessity” (7). A physicist may predict a planetary orbit by writing down the appropriate equations from a theory of gravity, or describe radioactive decays as being completely random. In general, the physical world behaves according to combinations of chance and necessity. Biology follows the pattern of modern physics when explaining evolutionary adaptation. The raw novelty in the genome comes from blind variation and mutation - largely due to chance. This variation is

then subjected to nonrandom selection. In other words, biology also combines chance and necessity in its central theories. Furthermore, this approach has been so successful in modern science that it motivates a more comprehensive physicalism, according to which everything in our world is physically realized (8). ID claims that this is incorrect – that intelligent design is a third, independent mode of explanation that is not reducible to chance and necessity. Intelligence, in the ID view, is beyond physics.

A number of the leading lights of ID have presented the claim that meaningful information can only be created by intelligence, and that intelligence is beyond chance and necessity, as a central aspect of ID (9). In particular, William A. Dembski, the leading theoretician of ID, has explicitly argued that ID is a third option (10). Moreover, he has proposed what he claims is a mathematically rigorous way to tell if a certain data set contains “complex specified information” (CSI) which is supposed to be the signature of an intelligent cause. In fact, CSI, in Dembski’s view, is just a pre-specified pattern which is extremely improbable to be produced by any combination of chance and necessity. At the heart of Dembski’s version of ID (11, 12) are two propositions:

1. There is a rigorous mathematical procedure to detect CSI, which is a reliable signature of intelligent design.
2. Intelligent agency is not reducible to any combination of chance and necessity.

If these two claims could be sustained, ID proponents would be justified in their hopes to usher in a scientific revolution. In fact, they could claim some success even if their efforts to cast doubt on biological evolution should continue to fizzle out. This is because ID, especially in Dembski’s version, is primarily a claim about complexity and about intelligence – not just biology. Even if biologists are (as they almost certainly are) correct about common descent, and if they are right about some of the mechanisms behind evolution, all would not be lost for ID. If propositions 1 and 2 are correct ID proponents could still infer a guiding intelligence behind biological complexity – the designer would then have injected all the necessary CSI into the world in the beginning. Regardless of any philosophical wrangling about methodological naturalism, ID proponents can also state that this designing intelligence is something beyond mere physical mechanisms.

None of this is likely to happen. Just in the past few decades, natural scientists have continued to learn a lot not just about the details of biological evolution, but also the physics of complexity and the nature of human and possibly even machine intelligence. None of this new knowledge is any comfort to ID. It is still possible to find a few thinkers with ID sympathies who think that concepts of self-organization in nonequilibrium thermodynamics pose a challenge to mainstream biology (13). However, these are intellectually marginal currents. In the study of complexity, the overwhelming trend is toward an invigorating synthesis of perspectives from biology, physics, computer science and other relevant disciplines. So it is very implausible that

ID should be correct. Most scientists who pay any attention to ID therefore ignore the substantive claims involved in ID and concentrate on countering its political influence.

Nevertheless, a number of scientists and science-oriented philosophers have examined the claims of ID in detail. In particular, Dembski's work summarized in proposition 1 above has come in for heavy criticism. Dembski hopes to detect design through examining a data set and eliminating chance and necessity as possible explanations. We infer design regularly in everyday life, and it is certainly interesting to try and formalize the reasoning we use to do so. Dembski proposes a rigorous way of making design inferences, and his initial effort was intriguing enough to be published by a reputable academic press (14). However, though it may have some intuitive appeal, it has become clear that Dembski's procedure suffers from numerous fatal problems (15). For example, he often assumes a uniform probability distribution to calculate a very small probability for a structure, and then takes this as reason to eliminate all element of "chance" as part of its explanation. Even his notion of CSI appears to be ill-conceived and badly defined, and it certainly has little to do with "information" as understood in mainstream work in information theory (16). Indeed, some critics have judged that Dembski's work is of very low quality and has little substance to be taken seriously (17). Dembski later tried to bolster his position by making use of the "no free lunch" theorems, arguing that blind mechanisms cannot create CSI but smuggle the information in from carefully chosen fitness landscapes (18). Again, numerous basic errors plague this argument as well (19). In short, Dembski and the ID movement as a whole have achieved nothing close to a rigorous way to detect design; they only have some intuitions that at the most have some vague commonsense appeal.

If modern science shows us anything, it is that our intuitions can fail spectacularly outside the domain of everyday life. Still, intuitions do not get discarded lightly. Even with its numerous technical errors, ID proponents might remain confident that there is something to Dembski's approach. After all, they often say, ID is a new paradigm. We cannot expect it to appear on the scene fully worked out, entirely free of problems. Dembski or others may have to go back to the drawing board, but the basic intuition that intelligence is something beyond natural processes will remain ever-ready to be resurrected.

So some critics of ID also ask if there is some deeper flaw in the intuitions driving ID, something not even a retooled, patched up design-detection procedure akin to Dembski's can overcome. For example, philosopher of biology Elliott Sober points out that design arguments (including ID) are problematic because they can succeed only given independent knowledge about the goals and abilities of the designer (20). If so, Dembski-style attempts to infer that some data is a result of design without making assumptions about the nature of the designer are inherently flawed.

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Sober's critique assumes that the likelihood form of design arguments are most defensible. But Dembski takes a different approach. If Dembski's CSI (or whatever new and improved variation ID can come up with) cannot indeed be assembled by chance and necessity, such criticisms would be moot. Moreover, Dembski's attempts to formalize a design inference implicitly includes knowledge about the kind of things human intelligence produces. ID proponents overwhelmingly come from conservative theistic backgrounds, and it is no secret that their designer is a personal, at least somewhat anthropomorphic God. So whatever the difficulties of generic design arguments in philosophy, it is not true that ID includes no expectations about designers – though the ID movement does not care to emphasize this, possibly for legal reasons.

To undercut the intuitions behind ID, we need something more: to explicitly argue that intelligence itself is a product of chance and necessity. Imagine that we were presented with a complex mathematical procedure useful in detecting design – that something related to proposition 1 were correct. This procedure could be a useful scientific tool; to borrow an example from Dembski, its uses might include tasks such as SETI astronomers figuring out if a signal they detected was produced by an alien intelligence (though SETI researchers today approach their problem quite differently than Dembski). But if we had good reasons to think proposition 2 were mistaken, then ID would still have no purchase on reality.

We have such reasons. The details of the argument, which rely on some of the technical apparatus of theoretical computer science, have been presented elsewhere (21, 22). In outline, however, it can be summarized.

Let us first characterize Dembski's approach to detecting design. Dembski might observe that if we encounter a slip of paper with "Bu sabah hava çok güzel, ama belki sonra bozabilir, belli degil..." printed on it, we have a very good notion that it is a meaningful message, even if we do not know Turkish and so have no clue what it means. We know enough about natural languages to see that it fits the appropriate pattern. Moreover, we can distinguish it from simple rule-generated strings such as "qaqaqaqaqaqaqa..." (the rule being "repeat 'qa' over and over") and random gibberish such as "uwl wdfjw2f af2h7kcfje/jvbppwvjo...". The Turkish sentence looks like the sort of thing an intelligence would produce. There is some nonrandom content in it, even if we do not know what it signifies. It might have been printed out by a computer, but in that case, we know that the actual content must have been pre-programmed into the machine. Machines are devices that work according to chance and necessity. And so Dembski argues that machines cannot create new CSI – they can only preserve or degrade the meaningful content.

Now, Dembski wants to infer design only from the message itself, without any knowledge of how it was produced. In that case, there is the question of distinguishing between a message printed by a computer and one scribbled out by a human. How can we say that the human is a genuinely intelligent source of new information, while a machine cannot do any such thing?

This is a long-standing question confronting researchers in artificial intelligence (AI), and it is no surprise that many ID proponents, including Dembski, have endorsed the position that humans can do things no mere machine is able to. In arguing against evolution, ID proponents continually assert that chance and necessity cannot assemble meaningful genetic information. Against AI, ID takes the same line: assert that chance and necessity cannot produce genuine novelty – that it cannot produce complex information. We know that humans are the source of new information, because we are flexible, creative, not bound by pre-set rules. Computers, by contrast, only follow pre-programmed rules.

The flaw in such an argument is that it does not adequately consider combinations of chance and necessity – in the computer context, procedures combining algorithms and randomness. As it happens, we know a good deal about just what a machine with access to a truly random function can accomplish and what it cannot. It turns out that the only tasks not performable by combinations of chance and necessity are certain “oracles,” and we know of nothing (humans included) that realizes such oracle-functions. In particular, information-containing output and creative tasks that introduce genuine novelty are not beyond machines that combine rules and randomness (22). “Artificial life” research provides some particularly telling examples (23). Dembski’s CSI is not and cannot be a signature for a kind of result no machine can ever produce. In a way reminiscent of Darwinian evolution (not coincidentally) randomness serves as a source of raw novelty, not conditioned by any rules. Rules, including interactions with a machine’s environment and with other machines, shape the raw novelty into something that is meaningful in its local context.

AI research faces a problem similar to what biologists once did: how to create meaningful information. And the Darwinian mechanism of variation-and-selection is a beautiful solution to precisely this problem. Hence much recent work in AI has taken a Darwinian turn. Moreover, recent thinking in the cognitive and brain sciences also highlights the role of Darwinian mechanisms in our own brains. So we can say, with considerable confidence, that intelligence is nothing supernatural. Intelligence is achieved by mechanisms combining chance and necessity, within the realm of ordinary physics.

ID falls hopelessly afoul of today’s understanding of complexity and information. This understanding, still partial and ever-expanding, combines insights from many separate disciplines. Physics sets the stage by describing a world operating according to chance and necessity. Physicists also help us understand how complex systems work by exploring self-organization and nonequilibrium thermodynamics, giving us clues about how complex self-replicating systems form. The mathematics underlying computer science gives us rigorous definitions of complexity and information, and a common language in a day when much of theoretical science has come to depend heavily on computer simulations. Cognitive and brain sciences, even though they remain far from maturity, still tell us much about human intelligence

that illuminates how chance and necessity combine to achieve complexity. But the centerpiece of our modern understanding of complexity comes from biology: Darwinian variation and selection. Darwin's mechanism is the answer to the question of how chance and necessity can bring genuinely new information into the world.

ID proponents are right to highlight the question of the origin of information. This is an interesting question. However, they treat information as a mysterious quantity and fail to make connections to established research concerning information. On top of this, they do not realize or do not acknowledge that mainstream science already possesses the critical elements of a satisfying answer to their question. In their political opposition to evolutionary science, ID proponents promise to be a significant irritant for scientific and educational institutions (24). But in responding to ID, its critics also have an opportunity to highlight today's developing multifaceted, interdisciplinary understanding of evolution and complexity. If more scientists thereby become more aware of how their specialties fit together with natural science as a whole, then ID might indirectly be of service to science after all.

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