NAME: _____

Philosophy 1104: Critical Thinking

Practice Quiz #6

TIME: 60 minutes

1. How good are the following explanations? Explain your answer briefly, supporting your judgment in each case by appeal to the conditions of a good explanation (the causation condition, the inference condition and the plausibility condition).

(i) Why are these cookies all burned on the bottoms? Because the oven is too hot. The excessive heat caused parts of the cookies, actually the bottoms, to burn.

(ii) Why did Anna and Bill hand almost identical essays? They must be causally connected in some way. Moreover, from studying them in detail, I see that Bill's essay has a few sentences that make little sense. The corresponding sentences in Anna's essay each have an extra word, and are meaningful. My hypothesis is that Bill copied from Anna.

(iii) I think this is a really good restaurant. Oh sure, the last three times we've been there the food was bad. But we were just unlucky. Every chef has the occasional bad night. And I reckon we just happened to show up on the chef's only 3 bad nights in the last year. (Let the hypothesis be: "this is a really good restaurant".)

(iv) That student is cheating, I'm sure of it. It's the only way to explain her high marks. I know I don't have any direct evidence yet, but I think she's writing cheat sheets using a special ink that only she's able to see.

(v) Why is the universe suitable for living organisms? Well, if it weren't, then we wouldn't even be here to talk about it! That's all the explanation we need.

2. Read the attached essays, and answer the following questions.

(i) How does Meyer define the thesis of intelligent design? (It is better to summarise this in your own words than quote Meyer's exact text.)

(ii) What is Dawkins' view of ID?

(iii) What do Dawkins and Meyer agree on?

(iv) What arguments does Meyer use to support his view? (Be sure to write down each premise of each argument, as well as summarising the reasoning.)

(v) What arguments does Dawkins use to support his view? (Be sure to write down each premise of each argument, as well as summarising the reasoning.)

(vi) As far as you are able, using some of the methods covered in this course, comment on the *soundness* of these arguments (from both sides).

Not by chance: From bacterial propulsion systems to human DNA, evidence of intelligent design is everywhere

Stephen C. Meyer
National Post

Thursday, December 01, 2005

[I have abridged the text – RJ]

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The modern theory of intelligent design was not developed in response to a legal setback for creationists in 1987. Instead, it was first formulated in the late 1970s and early 1980s by a group of scientists-Charles Thaxton, Walter Bradley, Roger Olson, and Dean Kenyon-who were trying to account for an enduring mystery of modern biology: the origin of the digital information encoded along the spine of the DNA molecule.

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Contrary to media reports, intelligent design is not a religious-based idea, but instead an evidence-based scientific theory about life's origins-one that challenges strictly materialistic views of evolution. According to Darwinian biologists such as Oxford's Richard Dawkins, livings systems "give the appearance of having been designed for a purpose." But, for modern Darwinists, that appearance of design is entirely illusory.

Why? According to neo-Darwinism, wholly undirected processes such as natural selection and random mutations are fully capable of producing the intricate designed-like structures in living systems. In their view, natural selection can mimic the powers of a designing intelligence without itself being directed by an intelligence.

In contrast, the theory of intelligent design holds that there are tell-tale features of living systems and the universe that are best explained by an intelligent cause. The theory does not challenge the idea of evolution defined as change over time, or even common ancestry, but it does dispute Darwin's idea that the cause of biological change is wholly blind and undirected.

Either life arose as the result of purely undirected material processes or a guiding intelligence played a role. Design theorists favor the latter option and argue that living organisms look designed because they really were designed.

But why do we say this? What tell-tale signs of intelligence do we see in living organisms?

Over the last 25 years, scientists have discovered an exquisite world of nanotechnology within living cells. Inside these tiny labyrinthine enclosures, scientists have found functioning turbines, miniature pumps, sliding clamps, complex circuits, rotary engines, and machines for copying,

reading and editing digital information—hardly the simple "globules of plasm" envisioned by Darwin's contemporaries.

Moreover, most of these circuits and machines depend on the coordinated function of many separate parts. For example, scientists have discovered that bacterial cells are propelled by miniature rotary engines called flagellar motors that rotate at speeds up to 100,000 rpm. These engines look for all-the world as if they were designed by the Mazda corporation, with many distinct mechanical parts (made of proteins) including rotors, stators, O-rings, bushings, U-joints, and drive shafts.

Is this appearance of design merely illusory? Could natural selection have produced this appearance in a neo-Darwinian fashion one tiny incremental mutation at a time? Biochemist Michael Behe argues 'no.' He points out that the flagellar motor depends upon the coordinated function of 30 protein parts. Yet the absence of any one of these parts results in the complete loss of motor function. Remove one of the necessary proteins (as scientists can do experimentally) and the rotary motor simply doesn't work. The motor is, in Behe's terminology, "irreducibly complex."

This creates a problem for the Darwinian mechanism. Natural selection preserves or "selects" functional advantages. If a random mutation helps an organism survive, it can be preserved and passed on to the next generation. Yet, the flagellar motor has no function until after all of its 30 parts have been assembled. The 29 and 28-part versions of this motor do not work. Thus, natural selection can "select" or preserve the motor once it has arisen as a functioning whole, but it can do nothing to help build the motor in the first place.

This leaves the origin of molecular machines like the flagellar motor unexplained by the mechanism-natural selection-that Darwin specifically proposed to replace the design hypothesis.

Is there a better alternative? Based upon our uniform and repeated experience, we know of only one type of cause that produces irreducibly complex systems, namely, intelligence. Indeed, whenever we encounter irreducibly complex systems--such as an integrated circuit or an internal combustion engine--and we know how they arose, invariably a designing engineer played a role.

Thus, Behe concludes—based on our knowledge of what it takes to build functionally-integrated complex systems—that intelligent design best explains the origin of molecular machines within cells. Molecular machines appear designed because they were designed.

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But consider an even more fundamental argument for design. In 1953 when Watson and Crick elucidated the structure of the DNA molecule, they made a startling discovery. The structure of DNA allows it to store information in the form of a four-character digital code. Strings of precisely sequenced chemicals called nucleotide bases store and transmit the assembly instructions--the information--for building the crucial protein molecules and machines the cell needs to survive.

Francis Crick later developed this idea with his famous "sequence hypothesis" according to which the chemical constituents in DNA function like letters in a written language or symbols in a computer code. Just as English letters may convey a particular message depending on their arrangement, so too do certain sequences of chemical bases along the spine of a DNA molecule convey precise instructions for building proteins. The arrangement of the chemical characters determines the function of the sequence as a whole. Thus, the DNA molecule has the same property of "sequence specificity" that characterizes codes and language. As Richard Dawkins has acknowledged, "the machine code of the genes is uncannily computer-like." As Bill Gates has noted, "DNA is like a computer program, but far, far more advanced than any software we've ever created."

After the early 1960s, further discoveries made clear that the digital information in DNA and RNA is only part of a complex information processing system-an advanced form of nanotechnology that both mirrors and exceeds our own in its complexity, design logic and information storage density.

Where did the digital information in the cell come from? And how did the cell's complex information processing system arise? Today these questions lie at the heart of origin-of-life research. Clearly, the informational features of the cell at least appear designed. And to date no theory of undirected chemical evolution has explained the origin of the digital information needed to build the first living cell. Why? There is simply too much information in the cell to be explained by chance alone. And the information in DNA has also been shown to defy explanation by reference to the laws of chemistry. Saying otherwise would be like saying that a newspaper headline might arise as the result of the chemical attraction between ink and paper. Clearly "something else" is at work.

Yet, the scientists arguing for intelligent design do not do so merely because natural processes-chance, laws or the combination of the two-have failed to explain the origin of the information and information processing systems in cells. Instead, they also argue for design because we know from experience that systems possessing these features invariably arise from intelligent causes. The information on computer screen can be traced back to a user or programmer. The information in a newspaper ultimately came from a writer-from a mental, rather than a strictly material, cause. As the pioneering information theorist Henry Quastler observed, "information habitually arises from conscious activity."

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DNA functions like a software program. We know from experience that software comes from programmers. We know generally that information-whether inscribed in hieroglyphics, written in a book or encoded in a radio signal-always arises from an intelligent source. So the discovery of information in the DNA molecule, provides strong grounds for inferring that intelligence played a role in the origin of DNA, even if we weren't there to observe the system coming into existence.

Thus, contrary to media reports, the theory of intelligent design is not based upon ignorance or religion but instead upon recent scientific discoveries and upon standard methods of scientific

reasoning in which our uniform experience of cause and effect guides our inferences about what happened in the past.

Of course, many will still dismiss intelligent design as nothing but warmed over creationism or as a "religious masquerading as science." But intelligent design, unlike creationism, is not based upon the Bible. Design is an inference from biological data, not a deduction from religious authority.

Even so, the theory of intelligent design may provide support for theistic belief. But that is not grounds for dismissing it. To say otherwise confuses the evidence for a theory and its possible implications. Many scientists initially rejected the Big Bang theory because it seemed to challenge the idea of an eternally self-existent universe and pointed to the need for a transcendent cause of matter, space and time. But scientists eventually accepted the theory despite such apparently unpleasant implications because the evidence strongly supported it. Today a similar metaphysical prejudice confronts the theory of intelligent design. Nevertheless, it too must be evaluated on the basis of the evidence not our philosophical preferences or concerns about its possible religious implications. Antony Flew, the long-time atheistic philosopher who has come to accept the case for design, insists correctly that we must "follow the evidence wherever it leads."

Stephen C. Meyer directs Discovery Institute's Center for Science and Culture. He received his Ph.D. in the philosophy of science from Cambridge University. He recently co-edited the book *Darwinism, Design and Public Education.*

Natural 'Knowledge' and Natural 'Design'

by Richard Dawkins

As conscious animals, we think of knowledge as something that we consciously know. A zoologist might see knowledge as facts that are useful for survival and reproduction, whether or not they are known to a mind. An orb spider's survival tool is its web, and it behaves as if it 'knows' how to build it. Each cell in an embryo lioness 'knows' how to participate, with millions of other cells, in a virtuoso performance of orchestrated origami whose end product is an adult hunter: a carnivorous machine with limbs to run, eyes to see, claws to subdue, teeth and enzymes to dismember and dissolve, guts to digest, and two uteruses to make new embryos that will preserve the genetically encoded 'knowledge'.

A spider doesn't know how to make a web as a fisherman knows how to make a net. Spider genes are a recipe for legs, muscles and spinnerets, together with a brain whose wiring diagram causes it to manipulate muscles in such a way that a web automatically results. The spider – presumably – knows nothing of webs or flies, any more than you knew how to build yourself during your nine months of unconscious gestation. Genes literally don't know anything, but in a powerful sense they store knowledge about environments from the ancestral past.

Beaver genes, 'knowing' about an external world of rivers, trees and dams, program bodies to exploit it. Like all mammal genes, beaver genes also 'know' about the internal world of mammal biochemistries and mammal bodies, and they build cells that transact the first and construct the second. Genes 'know' about their environment in the special sense that a key 'knows' the lock that it uniquely fits.

Where do genes gain their knowledge? All knowledge of the future must come from the past. Gene pools store knowledge of ancestral environments, and program future bodies to use it. To the extent that the future resembles the past, locks open and bodies survive to pass on the same genes. To the extent that it doesn't, bodies die, and the genes inside them. In extreme cases, whole species go extinct.

But how is the information read out of the environment and into the genes? This is the indispensable role of natural selection, the stunningly simple yet powerful engine of evolution first discovered by Charles Darwin, although he expressed it differently. Neo-Darwinians speak of the nonrandom survival of genes in gene pools. The gene pool of a species is the set of genes that is available, through sexual shuffling, for making individuals of that species. With the exception of clones such as identical twins, every individual is unique. But genes are things you can count. As generations pass, good genes become more frequent in the gene pool; bad genes disappear. 'Good' means good at building bodies that survive to reproduce in the environment of the species: woodland, sea, soil, coral reef etc. Regardless of external environments, good genes are good at cooperating inside cells with other genes that have become frequent in the same gene pool and are therefore, by definition, also good.

As a sculptor shapes a statue by subtraction of marble, so natural selection chisels the gene pool towards perfection as generations go by. It isn't only subtraction. New variation is added to the gene pool by mutation – random mistakes which occasionally turn out to be superior. The randomness of mutation is partly responsible for the widespread, ludicrous misconception that natural selection itself is a random process.

Nonrandom natural selection, automatically and without awareness or deliberation, funnels information about environments into the DNA of a species. This coded information fosters the illusion that organisms were designed precisely for their environments. Think of the uncanny resemblance of camouflaged insects to the background on which they sit. Think of the vertebrate eye with its high-res trichromat retina, variable focus lens, and light-metered fine-adjustment of the pupil. But think, too, of the strange fact that the vertebrate retina (though not that of the independently evolved octopus) is back to front. Light has to pass through a forest of connecting wires before hitting the photocells: exactly the kind of 'mistake' you would expect of an evolved, as opposed to designed, instrument.

Several factors conspire to make the natural illusion of design persuasive, complex and often beautiful. 'Arms races' between predators and prey, or parasites and hosts, drive the perfection of evolutionary adaptation to spectacular heights. Perfection is enhanced by large numbers of genes, each of small effect, cooperating with each other in cartels of long standing. The evolution of beauty is abetted by the principle that Darwin called sexual selection. The gorgeous colours of a male bird of paradise certainly don't help it to survive as an individual. They do help the survival of genes that make them attractive to females.

Above all, the illusion of design depends upon the gradual accumulation of small improvements, escalating to levels of complexity and elegance that could not conceivably be achieved in a single lucky step. We are rightly incredulous of any suggestion that biological complexity could spring suddenly from primordial simplicity in one generation. But it is easy if each step of a gradual progression is derived from its immediate predecessor which it closely resembles. That, in a phrase, is why evolution can so brilliantly explain life, where neither chance nor design can.

Intelligent design works as a short-term proximal explanation of cameras and cars, prize roses and poodles. But it is fatally flawed as an ultimate explanation for anything, because it miserably fails to answer the $64,000 question: Who designed the designer? That is not a frivolous debating point. It looms menacingly and fatally over the case – such as it is – for intelligent design. And, by the way, there is nothing new about 'Intelligent Design Theory.' It boasts a slick, adman-crafted name but (aside from an irrelevant shift into cellular biochemistry) it offers no new arguments beyond those that Darwin himself demolished in his magnanimous chapter on 'Difficulties'.

The central (and virtually only) argument offered in favor of intelligent design is the Argument from Improbability. Some biological feature – an eye or feather, biochemical pathway or bacterial flagellum – is claimed to be too statistically improbable (irreducibly complex, information rich etc.) to have evolved by natural selection (naive old-style creationists say 'chance'). Therefore, by default, it must have been 'designed'. Positive evidence for design is never even considered: only alleged failures of the alternative.

It is hard to imagine a more lamentably weak argument. The complex biological feature, in every case that has been examined in detail, always turns out to have a gradual ascent path leading to it. In any case, no attempt is ever made to show that the so-called alternative 'theory' of intelligent design fares any better. Ultimately, however statistically improbable, however irreducibly complex an eye or flagellum or anything else might one day prove to be, any intelligent being capable of designing it would have to be even more statistically improbable and complex.

Disingenuously, intelligent design advocates try to disguise their religious motives by claiming that the designer's identity is left open. Not necessarily Yahweh, it could be an alien from space. Scientists would not object to that in principle, because the stellar alien, who might indeed be god-like from our humble viewpoint, presumably evolved by a gradual, cumulative process. You can roll the regress back if you wish, to a designer of the designer. But sooner or later you are going to have to foreswear what the philosopher Daniel Dennett calls 'skyhooks', and employ a solidly founded 'crane'. The only natural crane we know is natural selection, and I have no doubt that if life exists elsewhere in the universe it will turn out to be, in the broad sense, Darwinian.

To the extent that creationists rely on the Argument from Improbability, they cannot get away with postulating an unevolved designer – who would have to be even more improbable. To the extent that they allow their unevolved supernatural designer to have sprung into existence *ab initio,* they should allow natural agents the same dubious privilege. Intelligent design is not only bad science; it is bad logic, bad philosophy and even – as my theologian friends point out – bad theology.

The United States is, by any standards, the leading scientific nation in the history of the world. Yet this unprecedented powerhouse of scientific achievement is being dragged down in derision, in the eyes of the entire educated world, by the preposterous antics now occurring in a Pennsylvania court, and threatening other boondocks of local democracy. A second rate mathematician, a mediocre biochemist, a born-again retired lawyer, and a Moonie have somehow succeeded in elevating themselves, in the eyes of influential but ignorant politicians, rich benefactors, and duped laymen, to near parity with the entire National Academy. How has it been allowed to happen? When will this great country come to its senses and rejoin the civilized world?