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A Response to "Does Natural Selection Exist?": Creatures' Adaptation Explained by the Design-based, Organism-driven Approach: Part 1

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Abstract

This paper responds to a recent paper (Jeanson 2013) critical of a series of *Acts & Facts* articles published by the Institute for Creation Research (ICR). That series introduced the use of design-based principles primarily to answer the question: what is the true or primary cause of organismal adaptation? It contrasted explanations for the primary cause of adaptation of naturalism's environment-focused mechanisms of natural selection versus an organism-focused, design-based mechanism (Guliuzza 2011a; Guliuzza 2011b; Guliuzza 2011c; Guliuzza 2011d; Guliuzza 2012a; Guliuzza 2012b). In this three-part response I will refer to the critical paper as "the critique" and the *Acts & Facts* articles as the "series." Part 1 correctly synopsizes important elements in the series' design-based explanation. The repetitive criticism that seeks to dismiss accurately identifying causality as merely a semantic quibble of terminology is countered. The critical chasm between the true causality of environment-driven versus organism-driven adaptive mechanisms—and their profound worldview implications—is further developed out of the series' design analysis (DA) methods as applied to living things. DA underscores that with either human or God-designed adaptable entities, true causality of adaptation resides within innate systems of the entity/organism; thus, adaptation is best understood via systems analysis. DA is shown to clarify the hierarchal relationship of organisms to their environment for adaptation, in that an organism's system-based programming during embryological development specifies features of traits, and it is these traits which *define* for its environment: 1) what is a "niche," 2) what exposures are "favorable" or "unfavorable," and 3) what exposures will be a "stimuli" for the organism's systems. Systems analysis finds that the route from external condition to adaptation runs strictly through elements of organism's systems, and that removal of any one critical element stops the organism's self-adjustment, therefore, no single element or anything outside of the system(s) can be identified as a primary cause for adaptation. In terms of primary causality, organisms must be designed up-front with a "nature," i.e., its multiple integrated systems, that causally enable it to be "nurtured" by environmental exposures through time. The DA in this response exposes naturalistic paradigms variously shaping post-graduate biological thinking about the environment's adaptive power (some advanced by the critique) as implicitly flawed and mystical by highlighting their appeal to scientifically undetectable events in their paradigms. Thus, the term "natural selection" is inherently misleading. It misascribes the true causality for the expression of traits by creatures suitable to dynamic environmental conditions—by not crediting such suitability as a success of the creature's innately designed systems, but that it is "due to" mystical "selection" events by non-sentient things like death or the environment. These views erroneously inflate the environment's causal power on organisms (by causally "instructing" them in embryological development or by adaptively "selecting for" and "saving" only favorable traits). These range from environments as a co-primary cause, up to them as the driver and "molder" of organisms through space-time, and thus, naturally causing the "apparent design" found in earth's diverse life. Seven design principles are discussed that when used to explain the adaptation of living things bolster the claims in *Acts & Facts*. Specifically, that populations of organisms are programmed with information-based systems expressing variable, heritable traits, which enable organisms to extract provisions from the environment, exploit natural properties, and self-adjust to external conditions as they go through space-time for the purpose of filling ever-changing environments of the earth immediately post-Creation.

Keywords: engineering analysis, reverse engineering, adaptation, engineered adaptability, self-adjustment, natural selection, naturalism, selectionism, mysticism, idolatry

Brief Contextual Clarifications of ICR's Series

If each distinctive kind of organism reproduced clones of themselves from generation to generation, then a theory of evolution could probably never get going. But populations of organisms do change over time. Though one kind of organism, say canines, has never been observed to change into a fundamentally different kind like felines, some impressive differences in varieties of canines is observed. Equally amazing, is the observation that traits of varieties of organisms seem to logically match environmental characteristics like long-haired canines in cold climates. Are there design-based mechanisms underlying how this happens? Possibly the most important question in explaining the origin of the diversity of life on earth, therefore, is: what is

the *vera causa* (the "true" cause or "primary" cause) of that change? Answers could be a design-based, organism-driven one, or a naturalistic environment-driven one, or some combination of both.

Organisms were designed with incredible innate adaptive capacity to glorify God

The series first explained for semi-technical audiences why they should begin to see adaptation from the organism-focused, design-based approach. Organisms are seen as designed fully and solely by God right from their beginning (Genesis 1:21, 27, 28). He equipped each one to make a journey through space and time. He providentially provides necessary resources for His creatures, which their innate systems process, as they make the journey (Psalm 104:10–24). During this journey the purpose of their basic designs is to reflect His nature, and the purpose of the outworking of those designs—to be witnessed continually by humans—is to manifest such wisdom so as to glorify His eternal power and infinite genius (Psalm 19:1; 92:5; Romans 1:20).

God is denied His rightful glory by those who ascribe ultimate causality of the created realm *of* nature *to* nature itself…which inherently gives credit to nature and not to God (Romans 1:18–25). This practice is one key manifestation of the worldviews defined as either materialism or naturalism. Naturalists view nature as dynamic which is composed of elements of the original environment and its subsequent manifestations.

Naturalism deflects credit for an organism's design from God to the environment

The series went in depth explaining how advocates of naturalism must first deal with the issue of "causality." Such advocates, as naturalists, always incorrectly ascribe causality from the Creator to the created realm itself. How could anyone believe that nature creates itself? By believing subtle bait-and-switch attributions of true cause. How they unfold is by cleverly appealing to some *created* feature within the created realm as the causal mechanism for its own *self-creation*.

The series illustrated this credit-deflecting ploy in how an engineer's rocket ship is acted on by a fanciful "natural" external force called "natural projection" which, some assert, actually causes it fly. Of course, the external process "natural projection" is *defined* as: the rocket's own innate volatile gasses being precisely mixed and ignited in the rocket's own designed chambers to produce thrust. Then as the rocket lifts off, some minds may not even detect that they are being tricked since they are truly seeing how "natural projection" really works—just like what a thinking engineer could produce.

It is cunningly smart to take well-working designed mechanisms *within* creatures and distort the explanation about their function as if it is now some *external* force acting on them to cause their own design. Thus, what observant person cannot see as one leading creationist wrote in private correspondence, "that natural selection is totally analogous to artificial selection, which has 100% demonstrable effects." Others may say that it's foolish to deny that nature isn't "favoring" some dogs by "selecting" ones to live in cold climates that have experienced environmental pressures to make thicker fur. As one evolutionist recently summed up,

> In the classical view of evolution, species experience spontaneous genetic mutations that produce various novel traits—some helpful, some detrimental. Nature then selects for those most beneficial, passing them along to subsequent generations. It's an elegant model. (Fearer 2013)

This "elegance" of natural selection is a powerfully seductive mental trap by its supposed obvious truism. The truism comes from the subtle and clever bait-and-switch attribution of the cause of adaptation from a creature's intelligently designed traits which overcome challenges (and credit to their Designer), to the created "environment" that possesses a mystical intelligence of its own—a God-substitute intelligence—that can "select" and "present." A biology textbook explains,

> Darwin not only demonstrated that evolution has occurred but also proposed its principal mechanism—natural selection. The key factor in natural selection is *the environment*. The environment presents challenges that *individuals with particular traits* can better overcome. Thus, the *environment 'selects'* which organisms will survive and reproduce more often. (Johnson 1988, p. 180, emphasis added)

Therefore, the environment gets credit for shaping (i.e., designing) organisms as they go through space-time, rather than populations of designed, self-adjusting organisms making their journey through space-time being credited with overcoming challenges.

Organism-focused, design-based explanations are precise while selection-based explanations are mystical

This paper underscores the benefits of engineering analysis (also called design analysis). The discovery of all biological function essentially uses "reverse engineering analysis" (a subtype of engineering analysis). Reverse engineering is a methodical disassembly analytical process of a discreet device or biological entity. It progressively identifies more specific causes of function through detailed

examination of the composition and relationships of its numerous parts in order to discover the basic information specifying its production and operation. Basically, it takes systems apart in order to figure out how they work.

A system is a functioning information-based network composed of numerous interconnected elements working together for a purpose.

Design analysis in living things is concerned with the function of an organism's systems—not with the undefinable, immaterial "thing" of *life itself*. Design analysis proceeds in deciphering the function of living things by reverse engineering them just like man-made things. Selectionists ought to demonstrate why, in terms of function, living things should be analyzed differently from man-made things.

Design-analysis is powerful in that it neither omits nor concocts elements in identifying where causality truly belongs. Design analysis describes all, but only actually observable, elements of systems innate to organism. In terms of the organism-environment interface, these systems can enable organisms to exploit an environment's properties and process its resources. Using this methodology, specific traits (and their underlying genetic/epigenetic information) which can actually be observed to either succeed or fail to solve those observable environmental challenges can be identified.

In like fashion, engineering analysis can show that environments do *not* have mystical powers—things which cannot be detected in any way—that are able to "select," "construct," and "instruct" only living things, but are not able to do the same with man-made things. Regarding natural selection as a supposed observable process, engineering analysis exposes that essential process elements are outside the realm of human detection. Specifically, scientific literature does not document that anyone has detected a real environmental "selection event" or the "selective sieve," quantified an environmental "selection pressure," or identified corresponding selective elements legitimizing natural selection's equivalence to a real "artificial" selection process.

Selectionists have not identified environment-based systems which are the proximate cause of a living thing's function—which engineering analysis elucidates as within autonomous entities.

Thus, this analysis technique is especially powerful in clarifying two extremely important design-related questions 1) what cause explains any environmental condition becoming a "stimulus" to an organism, and 2) what cause determines the "favorability" or "lethality" of any environment?

For example, consider this creationist's explanation of why some post-Flood human "cave men" differed from humans living today, "One possibility is that environmental pressures, such as the Ice Age, 'selected' for or against traits within the range of human genetic diversity. (In other words, those that had a particular combination of characteristics survived in that environment, and others did not)" (Purdom 2012, p. 58). The series pointed out that the first sentence explaining adaptation is unhelpful since: i) it falsely attributes causality to environmental pressures, ii) makes a mystical appeal to an imaginary "selector," iii) is needlessly death-and-survival driven, and iv) then must be clarified anyway in the second sentence with a truly scientific organism-based parenthetical comment. So, creationists could do better than to advance these types of explanations.

Design analysis reveals a misleading mental construct fueled by mystical projections of causal credit into scenarios invoking "favored" dog fur, "selected" cave men, or false analogies of natural selection compared to conscious human agency. Because "selection" is only a mental construct, it bears no resemblance to the real cause found in the outworking of complex systems within creatures which self-adjust to changing environments. Essential factors of design analysis are more fully explained later.

The organism-focused, design-based approach rationally explains why organisms and their environments work together in seamless operations

Another purpose of the series was to highlight the primacy of designed systems *within* autonomous living things and broader systems designed as cooperative networks *between* them. This is a greatly overlooked area of design. It turns out to be absolutely necessary in order to implement God's command to "fill the earth"—*before* there was any death and survival. The series advocated that creationists import engineering systems analysis to evaluate the functions—particularly adaptation—of living things and start patterning *explanatory* language after verifiable engineering design verbiage and forego misleading mystical selection-based expressions.

Organisms are interrelated elements of larger systems

Engineers may design one distinct entity like a radio to *work together* with another entity like a radio transmitter into a completely separate system called a communications system. This is a higher level of design which demonstrates significant forethought and wide-ranging designed control. Excellent designs integrate the actions of multiple independent parts into systems so well that they are described as having a "seamless operation."

A biblical explanation is design-based and organism-focused. It expects autonomous entities with innate designed adaptive capacity…that were furthermore originally designed to enable each to *work together* as parts themselves of larger, non-violent, cooperative systems. These systems would yield results (some synergistic) that facilitate populations to fill an ever-changing earth. Cooperation would not only be at the multicellular level, but extend all the way down to, say, fungi working together with the seeds of plants that together enable them both to live in colder climates, or utilize less water, or produce higher yields (Jones 2013, p. 199).

Creationists should lead the way in explaining the interactions of an organism to its environment as distinct entities working together as elements of a larger system (where each organism is likely not even cognizant of how it is contributing to that larger system.) This approach would show a higher level of design, thus, more glory to the Lord. It would also advance a significant argument against evolutionary thinking. Evolutionary explanations must default to mystical agency ascribed to unconscious nature—in lieu of a real thinking mind—to produce the obvious purpose seen when two (or more) distinct entities work together.

Since systems function for an intended purpose, successful outcomes are expected to happen. There is no need to make selectionist appeals to outcomes mysteriously "selected for" by environments. Those who do not analyze adaptation in terms of designed systems express surprise that natural selection "just happens" (Fodor and Piatelli-Palmarini 2010, p. 155) or "simply happens". (Lester and Bohlin 1989, p. 71) Knowing that "natural selection" is the misleading term applied to the processes of an organism's purposeful innate systems, then there is no surprise that any system labeled "natural selection" "happens"—of course it should.

Organisms have a designed nature that enables design-guided nurturing

Recall that for two autonomous living entities, each is part of the other's environment. But each are also components (possibly indispensable) of a larger system that normally is so intricately designed and operates in a so finely-tuned way that, "There is an almost seamless transition from one to the other" (Noble 2008, p. 3003). Noble rejects design in nature and, thus, sees the organism-environment distinction as "fuzzy." However, he likely has no trouble seeing a clear distinction between a spacecraft and its environment—because he acknowledges intelligent design of spacecraft.

One basic premise in design analysis clarifies the fuzzy nature-nurture distinction—at least in terms of causality. Organisms have innate capacity (their nature) which was designed to self-adjust to environmental conditions (their nurture), i.e., organisms came with a nature *designed to be* nurtured. A designed nature enables design-guided nurturing. Without a nature enabling nurturing present within organisms from the start, they would be as static as a rock.

In nailing down causality it is critical to know that a factor which is a so-called "secondary cause" can only be a cause at all because a "true" or "primary cause" designated the factor to be one. Given such a designed organism, though its "state" at a future time would be different from the present time contingent on both its innate nature and its external exposures, the primary, i.e., *true cause,* of getting to the changed future state is due to its innate nature.

The true cause is often an unseen *system*

Identifying causality can get tricky because a primary cause is usually an unseen system within organisms while secondary causes are often very obvious environmental conditions. This fact, coupled with the super high-quality "seamless operation" between an organism and its environment, makes it easy to disregard each as an autonomous entity or misidentify primary causality—reverse engineering analysis brings much clarity to this task.

The series explained by design analysis *how* organisms relate to their environment—which was radically different from the selectionist's understanding. It is possible that confusion over accurately identifying primary cause (and how conditions in the environment are not primary causes) prompted the critique to *incorrectly* sum up the series' position as, "…that the environment plays *no role whatsoever* in the adaptation process" (p. 289). Much of the critique's verbiage was directed at correcting an erroneous summation.

Identifying true, primary causes is facilitated by engineering analysis and is extraordinarily important. Some things the true cause determines: 1) what environmental condition will be a so-called "inducer," or "trigger" for an organism; 2) which traits of organisms determine if an environment will be so-called "favorable" or "unfavorable"; 3) how problem solving ability at the organism-environment interface resides in organisms.

Confusion about an organism's autonomy results from confusion on true causality

The series detailed that selectionist thinking struggles to produce explanations devoid of mysticism for how two living entities relate so tightly with each other, yet remain distinctly autonomous. Confusion on true causality leads to confusion over the autonomy

of organisms. Some researchers mysteriously blend individuals and/or ascribe volitional attributes to the system as a whole.

For example, some propose that earth—its matter, energy, and environments—is a "living organism" with operative agency and employ research of, "…ultimately testing a coupling in the Gaia hypothesis" (University of Maryland 2012). Or ecological selectionists who fail to distinguish individuality. They see living things melded into the collective as Gilbert and Epel describe, "While ecological developmental biology similarly postulates that we are defined in part by the 'other,' it depicts our identities as *becoming with* the 'other.' The relationship between 'self' and 'other' is not that between autonomous and antagonistic individuals, but that of non-autonomous agents-in-the-making that inter- and intra-act to form both themselves and other novel patterns" (Gilbert and Epel 2009, p. 407). "Life bubbles forth in a natural magic beyond the confines of entailing law, beyond mathematization, free to become the world Kantian wholes co-create with one another" (Kauffman 2011). And including the critique's own Gaia-like assertions like, "Nothing in Scripture explicitly forbids agency on the part of time, space, matter/energy and the environment….when the environment exercises agency as well" (p. 290). Yet, Scripture does identify which components of creation have intelligence sufficient to "select" and also condemns as idolatry ascribing active agency to non-livings things.

The organism-focused, design-based approach is not tied to death or places death before the Fall

The whole issue of death and survival is another important area highlighted by the series where selectionist thinking has derailed the creationist model and theology. The critique accurately affirmed Darwin's appreciation of death as the fuel of natural selection (p. 286). As Richard Lewontin also documented, death is Darwin's vital key to any adaptive process (Lewontin 1978, p. 220). That is because for selectionists it is self-evident that, "Death is selective" (Gilbert and Epel 2009, p. 292) and within naturalism's selection-based scenarios death is the bridge to good. Trapped theistic selectionists must contort biblical teaching into evolutionary molds. They attempt, though unsuccessfully, to justify death in a good way through God's omniabilities like, "God is able to make good come out of even death itself. Natural selection, though fueled by death, helps the population by getting rid of genetic defects, etc." (Purdom 2006, p. 275) or how a large Creation Museum claims, "Although natural selection results in the death of some organisms, it exhibits the care of God for His creation…" (Creation Museum 2014). Death and the process of natural selection are inseparable—a significant truth we creationists should consider before asserting that natural selection is a, "God-ordained process that allows organisms to survive…" (Creation Museum 2014).

The series offered a better way for creationists to extract themselves from this confusing theology without resorting to appeals to God's omnipotence or omniscience regarding the Fall (justifications which only work by invoking God's omnipotence/omniscience do not truly explain anything since they can, axiomatically, explain everything.)

What if death is just death; and stripped of its imputed mystical powers does not truly "select" anything? Suppose, from an engineering analysis, that it is actually the innate designed capability of an organism to produce traits to successfully solve an environmental challenge that is what determines whether an organism fills new environments. Suppose further that the capability built into these designs enabling many living things to successfully self-adjust to new challenges is robust enough to solve even extremely hard ones (like cooperative relationships perverted into predator-prey) in the death-filled, post-Fall world—an ability which it was never originally (and still isn't) purposed to do. Then death is not transformed into something good, it is an enemy and avoiding it is a problem to be solved (as 1 Corinthians 15:26 clarifies, "the last enemy that will be destroyed is death"). And a supposition that God designed organisms with latent information for adaptations that was switched on (by undetectable actions indicative of mediation) after the Fall enabling survival in the now imperfect world (Wood 2003) is an unneeded presupposition that is not necessarily specified in the Bible.

The organism-focused, systems-based approach is increasingly prominent in the most current research on adaptation

The understanding of biological function is rapidly changing even in evolutionary circles toward, "the goal of understanding the integrated function of complex, multicomponent biological systems" (Strange 2005, p. 968). The discovery of numerous systems paramount to adaptation has led researchers to recognize that explanations based on the status quo's process of mutations selected by environmental sieves are crudely inadequate.

Being naturalists, any explanation of real design is ideologically forbidden, but as they move away from selection they have coined terms that descriptively sound very close to designed *innate* capacity such as, "standing genetic variation," (Rohner et al 2013, p. 1372) "natural genetic engineering," (Shapiro

2011, p. 161) "cryptic genetic variation," (Sangster et al. 2008, p. 2963) "facilitated phenotypic variation," (Gerhart and Kirschner 2007, p. 8582) "adaptively inducible canalizers," (Meiklejohn and Hartl 2002, p. 468), and "evolutionary capacitors" (Rutherford and Lindquist 1998, p. 336). All of these are talking about a means to access innate self-adjusting capacity of what Waddington noted in 1942 as, "a suitable genetically controlled reactivity in the organism"…which he referred to, "as a set of alternative canalyzed [innate] paths" (Waddington 1942, pp. 564, 565). Some of these researchers have been severely criticized for questioning selection. While other atheist investigators are vilified for daring to accurately identify natural selection as nothing more than a magical "ghost-in-a-machine" (Fodor and Piattelli-Palmarini 2010, p. 163). The fact that materialistic evolutionists themselves feel like hypocrites should be a wake-up call to those of us who claim to be biblical creationists. Why shouldn't creationists be at the forefront to drop mystical verbiage and promote explanations which focus on innate designed capacities enabling organisms to self-adjust?

Attaching causality to analogies, metaphors, and figures of speech can make them idolatrous

It is recognized that in scientific literature scientists must use analogies, metaphors, figures of speech, say names of mythical gods like Jupiter and Mars, and, though distasteful to many, engage colloquialisms like "We'll see what Mother Nature has in store" or "only Father Time will tell." The main problem is when mystical analogies/anthropomorphisms (meaning there is not a one-to-one congruence to something tangible in real life) or colloquialisms are seriously used as *causal* explanations. It is not only poor science to ascribe causality to a mystical concept or volitional capability to inanimate things, theologically it amounts to idolatry. For instance it is mysterious to say, "When the moon is in the Seventh House and Jupiter aligns with Mars." It is idolatrous to add, "*Then* peace will guide the planets and love will steer the stars." Scientifically it is no different to say adaptive outcomes of organisms are *due to* time, space, or matter "exercising agency" or ascribed to a mystical "selection" event by the environment.

The series finally claimed that organism-focused, design-based explanations are superior, however they have not even begun to be developed or promoted; despite being scientifically verifiable and making powerful connections with people. The series provided evidence, yet the critique strongly requested additional evidence to back up the claims in the series and insisted, "Strong claims demand strong support" (p. 289). The following lengthy sections will hopefully develop and then fill in for any *Acts & Facts* space-limited or unintentional omissions. This begins with possibly the most important question in explaining the origin of the diversity of life on earth: what is the *cause* of that change?

> The central question:
> When organisms change (the effect), what is the true proximate cause of an organism's change (i.e., adaptation into an environmental niche?)

Intelligent Designer versus Materialism: Why Causality Matters

The series framed the magnitude of the issue for researchers to accurately determine causality. Causation is extremely important both scientifically and theologically for one paramount reason: causality is linked to credit which is linked to glory. God's glory is linked to His causative creative acts.

In contrast, one powerful, pervasive, and exclusively non-supernatural worldview that the online *Oxford English Dictionary* broadly defines as "materialism" insists that matter is all that exists. A sub-philosophy of materialism dedicated to cause-effect explanations is "naturalism" which contends that natural material properties within nature itself are the ultimate cause of everything. This worldview robs God of His glory due to the explanatory role of "Nature" (or its synonyms "Creation," "Cosmos," or "the Environment") as a primary cause. In the naturalistic worldview, the original environment (matter plus natural law plus chance) is the cause of itself and for everything that follows. Theoretical physicist Stephen Hawking explains, "Because there is a law such as gravity, the universe can and will create itself from nothing…Spontaneous creation is the reason there is something rather than nothing, why the Universe exits, why we exist" (Hawking and Mlodinow 2010, p. 180).

If Hawking is correct then the Bible is incorrect. How telling that these two clashing explanations—supernatural design versus naturalism (Meyer 1999, p. 19)—persist up to the present. The naturalist's appeal to make the environment causal is probably not due to its intuitive explanatory power of origins (Kelemen et al 2014, p. 893). But, logically, after a cause external to the environment itself is eliminated, what's left?

Though persuasive in the minds of many people, when critically analyzed, Hawking's explanations read more like fiction than science. Why? Well for starters, the substance for elementary particles and the law of gravity magically appear. They are mystically inserted into those causal explanations in order to make them "work"…which also mysteriously

transforms the environment into a substitute god. The series argued that within naturalism, i) environment as cause and ii) mystical thinking will always be found—though their manifestations may be more elusive to identify—in *each level* of causal explanations for the origination of: big bang, natural laws, life, and then adaptation.

The Bible is very clear that God alone deserves full credit/glory for all of creation as typified in Isaiah 42:8: "I am the Lord [Jehovah]: that is My name: and My glory I will not give to another, Nor My praise to carved images [idols]." Biblically, in terms of the creative causality for nature (Isaiah 42:6–8), there is no middle ground: it was supernaturally created by the self-existent eternal God. But how compelling would the evidence be for a Creator in a person's mind if causative credit for the design of the "things that are made" was convincingly redirected away from the Creator to something else…say, to the ultimate twenty-first century idol—the created things themselves?

God Creates Nature or Nature Creates Itself

Scripture does not set up a false dichotomy in Romans 1:19–25 when it states that humans will ascribe causative credit for nature's origins either to the Creator or to the created realm itself. In fact, it accurately frames the two dominant explanations for origins right up to now.

These are,

1. in terms of origination: Creator creates nature, versus nature creates itself;
2. in terms of means: agency, versus chance and law (necessity);
3. in terms of how the means could be detected: intelligently designed biological systems, versus biological systems designed by natural selection.

Two clashing causations: Agency versus chance and law (necessity)

Researchers try to explain the original cause of complex organisms (which includes their adaptive capabilities) as the combined or individual effects of two known non-volitional causes: chance events and natural law; as opposed to the one conscious, purposeful, intelligence-based cause: agency (Ayala 2004, p. 55). Intelligent activity is an everyday occurrence in human agency with it being detectable in a human-made thing by the information which specifies how its multiple parts will work together for a purpose (Dembski 2001, p. 171). Intelligent activity which stipulates how something will be made is defined by Webster as a "design." Agency—the expression of intelligence and volition—is claimed at the present time by creationists and intelligent design proponents to stand as the best explanatory cause for the design in living things as synopsized by Meyer:

> Undirected materialistic causes have not demonstrated the capacity to generate significant amounts of specified information. At the same time, conscious intelligence has repeatedly shown itself capable of producing such information. It follows that mind—conscious, rational intelligent agency—what philosophers call 'agent causation,' now stands as the only cause known to be capable of generating large amounts of specified information starting from a nonliving state. (Meyer 2009, p. 341)

In contrast, naturalism begins with the premise that the inanimate material environment controlled by contingency (chance) and natural law (necessity) existed long before the emergence of life. Therefore, the natural phenomenon of life in terms of its origination and function is due to the natural outworking of chance and law (Monod 1971, p. 119; Numbers 2003, p. 267).

In naturalism, natural selection is a universal law

As a designing mechanism, chance does not fill the bill. But a "natural" mechanism would be an omnipotent substitute designer if it could daily and hourly scrutinize every variation of every organism throughout the world and unfailing "selects" the good ones (Darwin 1859, p. 84). The process of natural selection functions as a law, as evolutionary microbiologist, Paul Ewald explains, "Darwin only had a couple of basic tenets…You have heritable variation, and you've got differences in survival and reproduction among the variants. That's the beauty of it. It has to be true—it's like arithmetic. And if there is life on other planets, natural selection has to be the fundamental organizing principle there, too" (quoted in Hooper 1999, p. 41).

On earth, naturalists claim that natural selection is the law-like element of the chance-natural law means to cause the design of organisms. Edward O. Wilson contends that, "If humankind evolved by Darwinian natural selection, genetic chance and environmental necessity, not God, made the species" (Wilson 1978, p. 1). In a forceful response against Senator Sam Brownback's backing of any design-based explanations, evolutionary biologist Jerry Coyne affirms this belief, "Brownback also presents the familiar creationist misrepresentation of evolution as a chance process, claiming that 'man…is merely the chance product of random mutations.' He doesn't seem to know that while mutations occur by chance, natural selection, which builds complex bodies by saving the most adaptive mutations, emphatically does not. Like all species, man is a product of both chance *and* lawfulness" (Coyne 2007, p. 212).

Natural selection, of course, derives its law-like creative powers from the erroneous notion that nature can select for traits just like a real human breeder. Thus, selectionism is a clever extension of naturalism in which nature—in law-like fashion—creates itself, as Dembski aptly sums up, "Thus according to Darwin, nature itself constitutes the supreme animal breeder that shapes the path of life. In particular, necessity, in the form of natural selection, and chance, in the form of random variation, are said to account for all biological complexity and diversity" (Dembski 2004, p. 80).

Specified complexity distinguishes agent causation from chance and law

How would one determine if the cause for the origination for the intricate systems found in living things, particularly for those controlling adaptation, was by means of agency (intelligence and volition) or by chance and natural law (necessity)?

Creationists and Intelligent Design advocates contend that Orgel's description of specification and complexity within living things are exactly the distinguishing features of any human designed entity (Sarfati 2008, p. 17). Thus, if someone was looking for a way to detect whether the originating cause of something was "agent causation" they would look for features unique to design, namely, the selection in advance of numerous parts working sequentially together for a purpose. Thus, design advocates recognize, "It is our universal human experience that whenever we encounter specified complexity it is a product of an intelligent agent. There is no free lunch. If specified complexity can be found in nature, then it, too, must be due to intelligent agency" (Wells 2006, p. 86).

Naturalists recognize life's complexity but deny any specification by "agent causation." They directly link the alleged law-like attribute of natural selection as the cause of life's design, "Natural selection accounts for the *'design' of* organisms…The arguments of intelligent design proponents that state the incredible improbability of chance events, such as mutation, in order to account for the adaptions of organisms are irrelevant because evolution is not governed by random mutations. Rather, there is a natural process (namely, natural selection) that is not random, but oriented and able to generate order or 'create'" (Ayala 2007, p. 77, emphasis added). Though far removed in time and scale from the notion that the universe created itself, nevertheless, Ayala-like thinking is another expression of naturalism's basic tenet that nature creates itself. Coyne reiterates Ayala's affirmation, "Life on earth evolved gradually, beginning with one primitive species; it then branched out over time, throwing off many new and diverse species—and the process producing the illusion of design in organisms is natural selection" (Coyne 2010).

In naturalism, the environment always causes adaptation

One essential fact of the naturalistic worldview is that nature itself is always the cause of anything found in nature—including the arrival and survival of living things. Chance, coupled to the law of natural selection working through the conditions of an environment drive the design and manufacture of organisms via a Darwinian adaptive process. In this view, *nothing* about an organism's function flows through the mind of a Designer.

In utter contrast, during the real design process, *everything* about an organism's function flows through the mind of the Designer—particularly the innate ability to express variable heritable adaptive traits. If the Designer did not design this capacity into creatures from the outset, they could *never* adapt. Adaptability does not originate via adaptation.

A leading naturalistic thinker about the process of Darwinian adaptation, Richard Lewontin, explains how environments drive the process. "Much of evolutionary biology is the working out of an adaptationist program. Evolutionary biologists assume that each aspect of an organism's morphology, physiology and behavior has been molded by natural selection as a solution to a problem posed by the environment" (Lewontin 1978, p. 216). Legendary evolutionist Leigh Van Valen summed it up as, "Evolution is the control of development by ecology" (Van Valen 1989, p. 1).

Of course, the environment-driven view also traces to Darwin, "He [Darwin] accepted the view that *the environment directly instructs the organism how to vary*, and he proposed a mechanism for inheriting those changes…The *organism was like modeling clay*, and remolding of the clay meant that each of the billions of little grains was free to move a little bit in any direction to generate new form…If an organism needed a wing, an opposable thumb, longer legs, webbed feet, or placental development, any of these would emerge under the proper selective conditions with time" (Kirschner and Gerhart 2005, pp. 3, 31 emphasis added). Selectionists see organisms as passive modeling clay and the environment is the modeler—causality could not get more natural than that.

In terms of causality, the critique's untestable assertion, "What if the environment did select organisms?" and plain observation "In reality, adaptation involves both the environment and the creature" (pp. 288, 290) evade the series' discussion of accurately identifying primary cause.

Theistic selectionists endorse the basic premises of evolutionary natural selection; however, they argue that evolutionists overextrapolate its "abilities." Yet, it should be obvious that naturalists could never begin with and credit an organism-driven adaptive process. Any capability an organism had to originate with chance and natural selection. What theistic selectionists may not recognize is the fundamental problem being that the basic premise of the natural selection process that they embrace, is *always* an *environment-driven* process which rides on the undetectable, but inviolate axiom of selectionists, that an environment exercises agency via its intrinsic selective capacity. Thus, naturalists can make a persuasive claim that in terms of the designs of life, ultimate causality and credit is due to the environment.

In naturalism, the environment "instructs" organisms to produce the arrival of the fittest and then "favors" the survival of the fittest

For decades creationists have taken comfort in their assertion that Darwin's model builder, natural selection, can only "work on" preexisting materials. Natural selection cannot explain the arrival of the "clay," i.e., phenotypes. Put poetically, the evolutionary mechanism of natural selection, "could explain the survival of the fittest *not* the arrival of the fittest." This weakness, however, is not new as it was recognized by Darwin and other evolutionists have leveled this criticism against the process of natural selection for decades (Gilbert 2006, p. 749; Harris [quoted in De Vries 1904, p. 401]). But within a naturalistic worldview, why shouldn't the environment be able to explain the "arrival" of phenotypes; given that nature can exercise agency and create the heavens, earth, and life, is anything too difficult for it?

Ecological developmental ("Ecodevo") evolutionists believe they have elucidated the power to create the arrival of new phenotypes and it is…the environment. At the conclusion of their chapter entitled, *The environment as a normal agent in producing phenotypes*, the ecodevo naturalists Scott Gilbert and David Epel summarize, "Environmental factors such as temperature, diet, physical stress, the presence of predators, and crowding *can generate a phenotype* that is suited for that particular environment.…Thus, in addition to helping decide the survival of the fittest, the environment is also important in formulating the arrival of the fittest" (Gilbert and Epel 2009, p. 33, emphasis added). "The study of developmental plasticity points to something quite unexpected in evolutionary theory: that the environment not only *selects* variation, it helps *construct* variation" (p. 369).

Exactly how do ecodevo selectionists see the environment exercising agency—and is it any less mystical? Gilbert and Epel give the details, "If the *environment is giving instructive information* as well as selective pressures…then group selection, until recently an 'outlier,' is brought to the center of evolutionary theory." "Ecological developmental biology has shown that the environment *can instruct which phenotype* can be produced from the genetic repertoire in the nucleus" (2009, pp. 407 and 370, emphasis added).

Design analysis shows that this branch of selectionism is no less mystical. Every man-made entity interfaces with its environment. In terms of design or construction, when did "environmental factors" like temperature, stress, or crowding acquire capability to "select," "construct," or "instruct" man-made entities? When did environments start "giving instructive information" to man-made things which can even adapt to differing environmental conditions? It is the design information which specifies (i.e., selects and defines) which external conditions will be "stimuli" or a "cue." These entities had plans and specifications detailing their design, and their construction was controlled by other information-based entities—not external conditions. Theistic selectionists have not given any.

Identifying Primary Causation: Vitally Important or Just Silly Semantics?

Researchers, from theologians to scientists, must start with an accurate identification of causality if they expect any of their explanations to be true. Thus, a fundamental purpose of science is to determine "cause." Meyer distills this important responsibility, "The early scientists affirmed this principle [identifying true cause or *vera causa*] as one of the key aspects of the scientific approach to understanding nature. This stood in opposition to the magical thinking that had gone before in which people attributed powers to nature that they had never observed it manifesting" (Meyer 2013, pp. 309–310). In terms of design, "primary" causes always specify or define what will be "secondary" causes. Naturalism starts with nature creating itself, and thus, tends to identify secondary environmental conditions as either the primary cause or a co-equal cause with an organism's innate capacity.

Design analysis shows that there is a fundamental tie between an entity's design quality, its traits, and the success or failure of those traits at solving problems from its exposures. Designers know that the cause of success or failure always resides with trait design, not the exposure. Why is this true? From a theoretical standpoint, an entity could be designed to successfully handle any exposure, though

from a practicality standpoint this never happens. Thus, lack of success of a design trait in handling environmental conditions is due to intentional design limitations or a design failure. The cause of a space shuttle's successful reentry from space is its design features and credit resides with the engineers—not to being "favored" by an atmosphere. The cause of a space shuttle burning up on reentry is a design failure of its heat shields and blame resides with the engineer—not to being "selected against" by the same atmosphere. Proper understanding of function and proper assignment of credit within explanations begins with a proper understanding of causality—this is not just semantics.

ICR's propositions to apply design analysis to adaptation—which flips the sufficient cause to organisms instead of environments—were brushed off as silly semantics. An example is the critique's rejection of the series' call for accurate identification of cause as, "really nothing more than a verbal dispute over terminology and not a genuine hypothesis about what actually occurs in nature" (p. 289). The series advanced the design-based premise that environmental conditions are only exposures to organisms and the primary cause of an adaptation is an innate self-adjusting capacity of the organism itself. The critique considered that straightforward proposal "difficult to imagine" and so "extreme" to the self-evident premise of environmental causations that ICR's series was caricatured as "waxing to metaphysical heights" and should be dismissed.

Environment-based Causations are Wrong in Explaining the Arrival of the Fittest

Natural selectionism says that when organisms are nurtured their nature is produced. In contrast, design analysis says that an organism's designed nature enables designed nurture. Based on our current evidence, how does that nature work itself out? Data has existed for years to show how the dated notion that so-called "environmental pressures" can drive the adaptation of living things is wrong in several areas.

First, selectionist thinking is caught in a simplistic trap. It sees a changed external condition and it sees suitable changes in organisms and it causally links the change as "due to" the condition. It fails to see distinct entities relating to each other as elements in a broader system and wrongly asserts that an *external* condition is the primary cause of a change in function *within* another entity. The naïve selectionist approach has locked up biological thinking for decades and has obscured a more realistic view of what is going on. This is increasingly documented by researchers,

> In everyday parlance, environmental stimuli is said to induce or even regulate the expression of specific genes. This notion is so engraved in the biological conceptual system that it comes as a revelation when, upon closer scrutiny, it turns out that no external stimuli that could directly induce the expression of any gene are known. No biotic or abiotic agent *per se* (the viruses' case is irrelevant) is capable of inducing expression of any gene. (Cabej 2013, p. 199)

External things like matter, space, organisms, and time are ascribed by selectionists to have both active agency and mystical capabilities that can somehow reach through the boundary of organisms and cause adaptive changes inside of it; as illustrated by the critique's affirmation, "Verses 1 and 2 of Genesis 1 do not identify these things solely as conditions, unable to exercise any agency whatsoever at any time" (p. 290). The series advocates the use of design analysis to show (*not* an appeal to Scripture as the critique mistakenly maintains) that external things are *solely* conditions to which autonomous entities are exposed.

Second, research has shown how any belief that adaptation results from random changes to individual molecules is utterly unrealistic. Current evolutionary thinking that i) an innate or environmentally-induced random mutation itself produces a phenotypic change, and ii) preserved in survivors after being filtered by a "selective sieve," is a gross oversimplification of a true systems-driven heredity process. That elementary scenario is illustrated in the critique's reasoning, "The environment (for example, ultraviolet light, carcinogenic chemicals, etc.) *causes* mutations…Guliuzza never eliminates an environmental role (for example, ultraviolet light causing mutations) for the adaptation process" (pp. 289, 290). Are such mutations *causal* in the adaptation process? There are some good reasons to reject that notion.

Waddington raised doubts decades ago about being forced into what he labeled the "selectionist" explanation as to its efficacy to explain what actually happens in development and said, "…we seem thrown back on an exclusive reliance on the natural selection of merely chance mutations. It is doubtful, however, whether even the most statistically minded geneticists are entirely satisfied that nothing more is involved than the sorting out of random mutations by the natural selective filter" (Waddington 1942, p. 563). His intuition was correct about adaptive-oriented innate systems in organisms as more realistic than simplistic selectionist arguments.

The outdated thinking by evolutionists as echoed in the creationist critique reduces to this: if one can show that, say, a particle of radiation causes a mutated molecule (a false premise itself since what gets into—or is kept out of—an organism is still a function of *its* trait designs) then they have pinned

down a *cause* of an adaptation. This is wrong. Current research shows that the cause of the outcome called "adaptation" only results from integrated multi-level systems (of which gene expression is only a facet of one system.) Design analysis can show that within biological systems there is no preeminent level of causality and that *the* single causal component cannot be identified. Integrated systems as a whole are the only cause.

> In that period [the past half century]…we have witnessed a paradigm shift in scientific thinking from an atomistic, mechanical, reductionist viewpoint to a systems perspective…Current "systems" thinking attributes primary functional significance to the collective properties of molecular networks rather than to the individual properties of component molecules. (Shapiro 2011, p. 129)

Critics of programmed filling need to wrestle with this empirical reality: God's created life-forms operate at the *organism* level. There is no heritable adaptation that operates only in a sub-organismic context apart from interacting with the rest of the organism. (Note, this does not imply that every element of a system is indispensable; it does imply, however, that any organism's component systems ultimately all interact as a living whole.) This premise reflects the findings of current research focused on multigenerational adaptations and the embryologic developments which are often tied to them—not just to physiologic homeostasis.

Design analysis reveals that for an organism's innate systems, it is essentially impossible to tease information, function, and causality apart. Oxford physiologist Denis Noble sums this up, "Second, reflecting Coen's point above, the processes represented in our modelling programs *are* the functionality itself….One of the major theoretical outcomes of multilevel modelling is that causation in biological systems runs in both directions: upwards from the genome and downwards from all other levels. There are feedforward and feedback loops between the different levels. Developing the mathematical and computational tools to deal with these multiple causation loops is itself a major challenge. The mathematics that naturally suits one level may be very different from that for another level. Connecting levels is not therefore trivial" (Noble 2010, p. 1131). Noble's statement referred to plant geneticist Enrico Coen's contention that, "Organisms are not simply manufactured according to a set of instructions. There is no easy way to separate instructions from the process of carrying them out, to distinguish plan from execution" (Coen 1999, p. 343).

Again, a seminal paper detailing one comprehensive regulatory network controlling embryonic development strongly promoted a better approach, "systems analysis," as essential to accurately explain multigenerational adaptations. They say, "Developmental regulatory network analysis can be done in any organism….But it requires a new mix of technologies and a new level of close interactions between system-minded biologists and computational scientists. It seems no more possible to understand development from an informational point of view without unraveling the underlying regulatory networks than to understand where protein sequence comes from without knowing about the triplet code" (Davidson et al. 2002, p. 1677).

Davidson et al. go on to emphasize that the minimum components necessary are certainly not a molecule or even a single system, but at the *level of the cell*, "The model thus represents an outline of the heritable developmental program, but the program is not the machine. The DNA regulatory network coexists with many other multicomponent systems that constitute the machine. These systems execute biochemical functions, produce signal transduction pathways, and cause cell biological changes to occur. They sum to the majority of the working parts of the cell" (ibid. p. 1677).

In a later paper, Noble reinforces Davidson's new conclusion and why it is essential for the biological community to adopt systems analysis. He details why simplistic "paradigms for genetic causality in biological systems are seriously confused" and current illustrations can have "even misleading impacts in the multilevel world of systems biology." He recaps, "Thus, there is a sense in which a cell, for example, and an organ or an immune system, is much more than its molecular components. In each of these cases, the molecules are constrained to cooperate in the functionality of the whole. Constrained by what?…The constraints lie in the boundary and initial conditions: 'organisation becomes cause in the matter' (Neuman 2006; Strohman 2000)….As Sydney Brenner has said, 'I believe very strongly that the fundamental unit, the correct level of abstraction, is the cell and not the genome' (Lecture to Columbia University in 2003). This fundamental insight has yet to be adopted by the biological science community in a way that will ensure success in unravelling the complexity of interactions between genes and their environment" (Noble 2008, pp. 3011, 3013).

Summarizing the implications of systems research, geneticist James Shapiro observed, "The contemporary concept of life forms as self-modifying beings coincides with a shift in biology from a mechanistic to an informatics view of living organisms" (Shapiro 2011, p. 4).

Several important conclusions flow from these observations. For starters, it would be just as pointless regarding biological systems to argue that

any single component is causal, as it is for someone to argue that the engine of a jet causes it to fly, while another argues for the wings, and another for the flight controls. When systems are so integrated whether it is a human-made entity, a single cell, or a multicellular organism, causality should be ascribed to innate systems. Next, environments likely have properties to be exploited and resources to be utilized by organisms, but they do not have identifiable systems to cause designed things to function—which reside within autonomous entities. Selectionists have not shown where causality could ever be shared with anything outside of the organism.

Environment-based Causations are Wrong in Explaining Survival of the Fittest

In terms of adaptive causality, are an organism's changes due to lethal environmental exposures driving it by "selective pressures," or are they driving themselves via self-adjustments that either succeed or fail at solving environmental problems, or by some elements of both? Or does it not make any difference at all and this is just splitting hairs over semantics?

The central dogma of evolutionary natural selection is that: death is selective and it is environments which causally dispense death. Thus, environmental conditions sieve (i.e., eliminate) information from the gene pool of populations causing a change in their gene frequencies (and phenotypes) over time. This sequence of events is claimed to amount to a powerful type of pressure.

What determines the "lethality" of something in the environment?

Say two mice, a rat, and a lizard eat the same amount of some vegetation found in a niche. What explains the fact that one mouse got sick, one mouse died, the rat was unaffected, and the lizard obtained a necessary nutritious dietary supplement? It is the innate physiological traits (which also help regulate an organism's microbiome) which determine degree of "lethality." How the organism's metabolic systems process the vegetation are the cause which determines whether it moves itself into and fills the niche or not.

Say summer has left Siberia. A blanket of snow and cold air returns. A pregnant white rabbit and a pregnant brown rabbit are in the snow looking for lunch. A hungry eagle is also out looking for lunch…and soon flies off clutching the brown rabbit. Did the eagle select against brown rabbits and cause a change in genetic frequency for fur color in the rabbit population? Can we credit the eagle's selective actions with driving fur adaptation of rabbits? No, as explained by design analysis. The eagle is intelligent and can certainly make choices. But intelligent creatures need at least two things to choose from to be a legitimate choice. If one rabbit is visible in the snow but the other is concealed, then there is really no choice as all. The eagle eats the one it can see. Why can't it see the white rabbit? Where does the credit for the camouflaging nature of white fur reside? The systems producing rabbit fur color are innate to rabbits—not the eagle or the snow. Eagles, snow, and cold temperatures are problematic exposures. Design analysis looks to where the information resides that specifies solutions to problems. It is the information-based systems within a rabbit that produce traits which can successfully solve environmental problems that determine which rabbits will fill the niche. It is mystical to say that problems "select" their solutions—something that would never happen with man-made systems.

Accurately identifying causality clarifies the misleading thinking about the selectionist's prized concept called a "selection pressure." Nearly everything in the evolutionary account is driven by selection pressure—so much so that if there is *no* external selection pressure, there is *no* evolution. Some selectionists insist that they can actually measure selection pressure and can easily demonstrate it by the pressure exerted on a population of bacteria by an antibiotic. Design analysis again shows that it is the bacteria's traits which make them either susceptible or resistant.

If the evolutionary scenario is built on misidentifying causality, then this is not semantics. Just like natural selection is always used as an external agent working on organisms—but is defined in terms of their innate abilities—so is the concept of selection pressure. This truth is revealed upon close examination of Ernst Mayr's description of selection pressure:

> In evolutionary discussions, it is often stated that "selection pressure" resulted in the success or elimination of certain characteristics [misascribed environmental causality]. Evolutionists here have used terminology from the physical sciences. What is meant, of course, [reality] is simply that a *consistent lack of success of certain phenotypes* [organism-produced] and their elimination from the population *result in the observed changes in a population* [organism credit/blame]. It must be remembered that the use of words like force or pressure is strictly metaphorical, and that *there is no force or pressure connected with selection*, as there is in discussion in the physical sciences. (Mayr 2001, p. 281, emphasis added)

Unless selectionists can otherwise document in the literature, despite their claims to have measured any selective pressure, there is nothing real to measure and there is no environment-based metric. What are

measured and reported are *organism-based* metrics of fertility, gene frequencies, or death rates which represent the ranges of systems variability at solving environmental problems inherent in the population.

The Biologically Meaningful Approach to Causality: Design-Based Thinking

What if the exact opposite of environmental causation were true? What if populations of organisms could be seen from a design-based perspective as traveling through space-time—including all of the different environments that entails—just as a man-made space vehicle traverses multitudes of environments to the moon and back? All environments faced by the spacecraft are challenging exposures which the spacecraft detects and is itself 100% innately designed to solve. Environmental challenges are not designing the spacecraft; rather the designed spacecraft solves environmental challenges.

The same would be true for organisms. A leading investigator claimed, "Being able to exhibit alternative phenotypes offers an individual the opportunity to optimize their fitness as they experience different environments over time and space" concerning his research on organism's changing embryological development to changing environments benefits itself (Relyea 2005, p. 856). Just like an individual's physiologic self-adjustment, individuals and populations over multiple generations could express a continuous spectrum of physical traits (phenotypes) from a relatively stable genotype enabling them to better fit into a range of environmental conditions—actively detected by the organisms.

An explanation of how organisms adapt via self-adjusting design-based principles could naturally generate a powerful hypothesis.

> What if the engineering principles underlying how human-designed things self-adjust to changing environments is the most accurate way to explain how organisms adapt?

If correct, it could be the basis of a powerful designed-centered paradigm to frame how organisms actually (and actively) self-adjust to—and are *not* passively adapted by—their environments.

Seven Premises of Design Analysis to Consider a New Approach to Adaptation

1. Organisms self-adjust by the same principles underlying how human-designed things self-adjust to changing environments.

Engineers consider one hallmark of truly great design is an object's capability to maintain function under a large range of conditions. This capability is also true for organisms. Organisms possess information-based cellular mechanisms underlying their parts, development, and adaptive abilities. Adaptation might best be understood if treated principally like a study of engineering processes.

> We have also found that despite their vastly different substrates, biological regulatory mechanisms and their synthetic counterparts used in engineering share many similarities, as they are both subject to the same fundamental constraints that govern all regulatory mechanisms. The architectures of both cellular and engineered regulatory networks exploit sensors to measure disturbances and regulated variables of interest and use these measured signals to induce action that regulates the outputs of interest through a network of feedback and feedforward loops. Notions used in the study of engineering control systems such as optimality, nonlinearity, robustness, isolation, modularity, and feedback are invaluable for understanding biological complexity… (Khammash 2008, p. 327)

One reflexive push-back to the design-based analysis of the operation of living things is that they can reproduce. However, the distinctive functions of living things which are metabolism, adaptation, growth/development, and reproduction could conceivably be mimicked in every way by an extraordinarily complicated man-made entity. This fact, of course, would not confer to the man-made entity "life" which is an nonmaterial attribute, but in terms of their operation, there is nothing mystical about living things.

2. Pro-resilience organized complexity characterizes all self-adjusting entities.

A key engineering concept is "resilience." Adaptive traits that resist damage, mitigate loss, or enable quick recovery are said to be resilient. Resiliency is accomplished by means of design strategies spanning brute resistance to passive flexure to avoidance.

A resilient entity must be "robust." This means that it continues to maintain its general characteristics in changing conditions. Additionally, particular internal and external traits of resilient entities must be "plastic," meaning that they can change within "ranges" that are specified to allow adequate problem-solving leeway, but not completely change the general characteristics. Within living things, the phenotype they express is also "plastic" and, "…phenotypic plasticity provides the potential for organisms to respond rapidly and effectively to environmental change" (Charmantier et al. 2008, p. 800).

Waddington speculated early on that organisms would be found to have innate systems to optimally control plasticity and robustness. He predicted, "In

general, it seems likely that the optimum response to the environment will involve both some degree of proportionality [same idea of plasticity] and some restriction of this by canalization [innate tendency toward the norm]. The most favourable mixture of these two tendencies will presumably differ for different characters" (Waddington 1942, p. 564).

Multiple parts functioning together for a purpose, where parts-match precision by necessity omits all other parts, establish "specified complexity." The loss of any of any single remaining part resulting in the loss of primary function establishes "irreducible complexity"—a kind of specified complexity. Well-matched interacting components which confer a range of problem-solving capacity and preserve general characteristics, while maintaining function in uncertain conditions, establish "pro-resilience complexity"—another kind of specified complexity.

Resilience is a design-driven characteristic, meaning design elements alone are the sole reason traits may not achieve resilience. Thus, traits may *not* achieve resilience because of a total design failure, or because the design was never intended to cover all external conditions and was expected to be overwhelmed at times. Surprisingly, resilience may also be due to parts that are designed to break (like a car's crumple features that absorb considerable energy and thus help to protect the car's occupants or, perhaps, a gecko's tail that is designed to break loose and thus allowing the gecko to escape a predator latched onto its tail.)

3. Systems (originated from and comprised of innate, universal information-based, interdependent components, and intrinsically regulated as an integrated whole) produce self-adjustment in organisms.

Systems analysis identifies several core characteristics of a system which are: 1) a boundary which distinguishes the system from its environment; 2) logic networks which determine behavior and regulate elements; 3) a connectivity of interworking elements related together by structure, process, or behavior; 4) a time-delimited direction of process flow of interworking elements often described as "upstream" and "downstream"; 5) a purpose to transform inputs into outputs.

The growing importance of innate information-based networks was noted with surprise over the last century to many who expected adaptation to be driven primarily by mechanistic forces in the environment encountering mechanistic forces in the organism. Geneticist James Shapiro observed this irony, "The contemporary concept of life forms as self-modifying beings coincides with a shift in biology from a mechanistic to an informatics view of living organisms. One of the great scientific ironies of the last century is the fact that molecular biology, which its pioneers expected to provide a firm chemical and physical basis for understanding life, instead uncovered powerful sensory and communication networks essential to all vital processes…" (Shapiro 2011, p. 4).

Organisms utilize systems as the mechanism to produce a series of self-adjusting actions in order to maintain their general characteristics when exposed to changing conditions.

Systems often possess key elements which interface with its environment demonstrating both designed dependence and autonomy. Interfacing elements may extract necessary resources (usually energy and raw materials) from the environments which demonstrate a dependence of the entity on its environment. Autonomy is established in that systems in the entity function as a self-contained whole for the purposeful processing of resources without additional assistance—and independent—from the environment.

Design analysis helps to clarify any confusion between thoughts of "dependence" and "operational causality." It shows that from an operational causality standpoint, systems may be designed to use necessary resources, but dependence on resources is entirely an insufficient cause for a system to function. Operational credit always resides with the designer of the system(s). For instance, most modern automobiles are designed to depend on gasoline as a fuel resource. But the gasoline is only an insensible input which is processed to extract its potential energy by information-based systems innate to the automobile, and thus, causing it to run. Spacecraft need fuel to travel, but it is the systems which comprise the spacecraft as an entity which cause it to get to the moon and back.

Interfacing elements called sensors often function in surveillance of the environment to detect conditions predetermined by the system's logic centers. Design analysis can be utilized to determine what has been defined by the system for itself as appropriate external "signals," "cues," etc.

4. The core components of self-adjusting organism's systems are irreducibly complex (i.e., they exemplify "all-or-nothing" unity).

Engineering control of man-made adaptive systems fills textbooks. At the root level, self-adjusting entities exist to maintain specified performance suitable within a range of varying exposures through planned intrinsic problem-solving capabilities.

For self-adjusting entities, a minimum system comprised of three well-matched interacting

components is essential to maintain adaptable function: 1) an input "sensor" actively gathers data on external conditions; 2) a reference program that defines performance within specific external conditions and has a logic segment to compare input data to the reference; 3) an output "actuator" that executes actions that maintain performance. If any one of these components is removed, the system's adaptability is lost, i.e., the system is irreducibly complex. Self-adjusting organisms have these well-matched components.

Irreducibly complex systems clarify another point tied to causality; which in terms of self-adjusting systems is that all three components above are *equally important* and only together are they sufficient to cause self-adjustment. For instance, something may get perturbed in the reference program (say some memory on a chip was deleted after being exposed to radiation) so changed information is sent to the actuator. Performance may be different—assuming it wasn't totally lost. Tracing back for causes could show that the radiation caused deletion of the information on the chip, but all-or-nothing unity shows that the cause of any changes in outcome of the system are still a function of the entire system (Guliuzza 2010, p. 10).

5. Sensors comprise the essential system component at the organism-environment interfaces—the principal trigger within an organism's self-adjusting systems.

As a spacecraft travels through space-time it maintains both its distinct boundary and functional conditions while traversing through diverse environments. Spacecraft designers anticipate the environmental conditions and the challenges they will encounter and build in sensors specifically designed to detect those conditions. These sensors are linked to systems which will produce necessary innate adjustments. If the spacecraft was expected to be "automated" (operate without outside control), then intrinsic sensors would be indispensable.

In like manner, multicellular organisms are automated distinct entities which maintain their boundary and functions as they travel through space-time. However, their capability to self-adjust must accommodate spans of time from a fraction of a second for physiological to multigenerations when considering a whole population. To severely complicate matters, organisms may need to solve challenges to conditions which have never appeared on earth before.

The component of self-adjusting systems which is positioned at the boundary of the organism and its environment is the sensor. Sensors are exquisitely designed to be selective. That is sensors are sensitive to specified external conditions while insensitive to a myriad of other conditions. Their presence should minimally disturb or alter the value of the condition being monitored so it remains a "true value."

An expert on system design highlights the role of sensors in initiating data acquisition, "A sensor does not function by itself; it is always a part of a larger system that may incorporate many other detectors, signal conditioners, signal processors, memory devices, data recorders, and actuators…A sensor is always a part of some kind of a data acquisition system.…Depending on the complexity of the system, the total number of sensors may vary from as little as one (a home thermostat) to many thousands (a space shuttle)" (Fraden 2010, pp. 4–5).

Three key characteristics of sensors are seen by design analysis. First, sensors, detectors, or receptors are always an integrated part of the system. Second, since sensor design always specifies what environmental condition it will be sensitive to, meaning it defines what constitutes actual environmental "signals" or "stimuli" for itself (which explains why multitudes of other exposures are never stimuli). Third, a sensor must always be ready to collect data by means of detecting a condition (and many system designs conduct active surveillance for conditions). Design analysis shows that systems with integrated sensors are sufficient to initiate the causal systems of organismal self-adjustment. Sensors are the actual "triggers" of a process and real triggers are integral parts of designed things.

Systems specialist Jacob Fraden notes that sensors and systems which detect, relay, and process information are treated as an enigmatic "black box" in cases where analysis leaps from stimulus to response. This is a profound mistake in terms of really understanding biology or accurately identifying causality. If key elements of a designer's designs are completely ignored in explanations, then it is easy to misattribute primary causality to phony factors rather than to the correct features of a design.

Plasticity of traits capable of solving environmental challenges over multiple generations appears to be expressed primarily in embryonic development and maturation via highly regulated systems after detection of external environmental *conditions*. It is possible that some intergenerational variability is truly randomly generated and fortuitously fits environmental challenges—a serendipitous event experienced by engineers as well in the outworking of their design processes. Other highly intricate mechanisms are designed to both induce and utilize random mutations as a means to produce variable traits that may prove suitable to external challenges.

6. **Loss of function—not adaptation—normally results from thoughtless tinkering (accidental occurrences) with components in established systems with functionally integrated parts.**

Established systems with functionally interconnected parts operate for a purpose. Due to the likelihood of a catastrophic loss of function, an engineer's flexibility is constrained in any plan to change connections or parts of the system. That constraint on flexibility increases as parts and connections increase. Increasing numbers of integrated parts significantly increases the difficulty of making successful modifications and increases the likelihood of unintended negative consequences resulting from changes whose relationships were too intertwined to see in advance.

Suppose an engineer does not have full information on some problems he needs to solve. One strategy could modify an existing system so it will generate a wide variety of *potential* solutions with the hope that one will solve the problem(s).

Often, a better solution is to build a whole new system (or a complete subsystem) with specific features purposed from the outset to facilitate random "tinkering" to promote a variety of outcomes.

The reality is that on a biochemical basis many adaptive mutations turn out to be loss-of-function mutations and show up conveniently enough to question the idea that they are from thoughtless tinkering or result from systems enabling a fortuitous fit to environmental challenges. Rather, it appears that a purpose in the extensive genetic redundancy is to allow for these types of changes to take place.

7. **The *first* purpose for reproducible, variably self-adjustable, and heritable traits is to solve changing environmental challenges ultimately to multiply and *fill* earth's diverse habitats—not *survival*.**

Could a reason God designed organisms to self-adjust with incredible innate problem-solving capacity be to manifest an ongoing display of the genius of their incredible Designer?

In Genesis 1:28, God commanded, "be fruitful [divide, differentiate, branch off], and multiply [increase in quantity]; fill the earth [establish an expanded geographical presence]." In Genesis 1:22 He commanded the sea and air creatures to multiply and fill their dynamic environments. The Lord directed His *creatures* to fill environments—before stress due to death or survival. (Notice that the Lord did *not* command environments to favor or disfavor living creatures in their efforts to survive.) Yet these organisms still needed to adapt to a range of varying exposures on the primordial earth such as day-night cycles, seasons, and as creatures fill an environment they change it. Plants and animals needed heritable self-adjusting programming right from the beginning.

Treating the environment-organism relationship as the relationship of a problem to its solution is the approach adopted in medical research, biomedical engineering…and now design-based adaptation. Harvard's best known evolutionary geneticist, Richard Lewontin asserts that engineering analysis may be the best way to determine if a trait actually solves an environmental problem (Lewontin 1977, p. 221).

Innate Self-adjusting Capacity is likely a Basic Characteristic of All Living Things

The examples presented in this paper only illustrate the innate self-adjusting capacity of a few organisms that likely is a basic characteristic of all creatures right from the beginning—a phenomenon which several top researchers have noted, "For the past century, ecologists and evolutionary biologists have documented the widespread occurrence of phenotypic plasticity, from *protists and bacteria to plants and animals*" (Relyea 2005, p. 856, emphasis added).

Could the incredible innate systems enabling self-adjustment that proved effective at solving certain challenges prior to the curse, also be utilized in solving post-curse challenges such as predation? Without a doubt, there has been universal corruption and significant perversion of good things with the advent of sin. Scientific evidence may indicate that, unfortunately, the reality of plastic phenotypes which was never intended to enable survival may now be a means to solve the problems of things like predation. "Such an increase in genetic variance in a plastic trait has been interpreted as additive genetic variance for inducibility" (Agrawal et al., 2002). "An increase in genetic variance in traits involved in inducible defences in the presence of predators *may therefore be a common occurrence*" (Kraft et al. 2006, p. 1817, emphasis added).

What we need to explain are the changes within populations expressed as organism-based metrics of fertility, gene frequencies, or death rates. Design theory explains these observations as caused by distinct entities with the innate design capacity to reproduce variable, heritable, traits which either succeed or fail to solve environmental challenges—with no need to invoke a mystical selector.

"Nearly every embryo probably has environmentally determined components in its phenotype. *Therefore, a complete list of organisms with phenotypic plasticity would resemble a survey of all eukaryotes on the Tree of Life*" (Gilbert and Epel 2009, p. 13, emphasis added). Ignoring the counter-factual remarks about the "Tree of Life" and "environmentally determined" components (thought-constraining assumptions of a naturalistic

world view), Gilbert's (and Epel's) observations about the extent of phenotypic plasticity could be considered a remarkable testimony about the resilient design of organisms created to "fill" a dynamic and challenging earth.

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