The non-random character and intelligent design of 'chance' events

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Recent advances in general design theory are discussed. In particular, a signature that implies that 'randomness' is, in general, designed by a higher intelligence and that all natural-system behaviour that is deemed as probabilistic in character is specifically designed, produced, coordinated and sustained by a higher intelligence. These conclusions are based upon an interpretation for mathematically obtained results and indirect evidence. Aspects of these results are related to the Scriptures.

Over seventy years ago, Tarski[1] defined the mathematical object called a **consequence operator**. These operators, when applied to a set of physical hypotheses, generate specific physical theories. These operators actually mirror the logical processes that produce such theories. Tarski's basic operator rules state that (1) the hypotheses must be part of the physical theory. (2) If you apply the accepted logical methods to the theory itself, then nothing new is deduced logically. (3) To obtain any statement in a physical theory, you need only apply the logical processes to finitely many hypotheses. These operators also model many human mental processes (that are considered as rational where two categories are investigated mathematically).[2] Neither set theory nor any formal mathematics is presented in the main body of this article. All the mathematics is available in either journal form or at the Los Alamos archives. I discuss two recent discoveries in informal terms.

A **natural-system** is a set or arrangement of physical entities within our universe that are so related as to form an identifiable whole. A virus, our solar system, our sun are natural-systems. In 1979,[3] the notion that natural-system behaviour is intelligently designed was first mathematically analyzed. For example, the moment-to-moment physical alteration of our sun is shown to be intelligently designed. Such analysis is accomplished by applying consequence operator theory to physical science. A specific mathematical theory is used and this theory **predicts** the mathematical existence of a **higher intelligence**[4] as a completely rational source for either the creation of or general alterations in the behaviour of various natural-systems within our universe.

Recently,[5] Gitt[6] information theory was modeled by means of the general informational consequence operators (IC). These are consequence operators that are restricted to the Gitt notion of information. Recall that when you have an operation between two mathematical objects, say multiplication $A \times B$ of two numbers A and B, then the operator satisfies the **commutative property** if $A \times B = B \times A$. To generate 'random' behaviour, such as biological mutations, these IC operators must possess a special and non-random commutative property,[5] while other consequence operators do not share this feature. This signifies that it is rational to assume that the IC operators are specially designed for the purpose of generating what we perceived as random behaviour. One may assume rationally that this property is a **signature** that implies that such behaviour is intelligently designed. However, this is a hidden property that is not observed directly. For example, for biological entities, the term **random** signifies that there are no relationships or processes describable by an appropriate physical language that allows one to 'predict' a single mutant's altered characteristics. Biologists often consider the random generation of mutant characteristics as being **absolute** in character. This means that the notion of 'describable' is removed from the above definition. But, these recent results show explicitly that the concept of 'randomness' is theory and language dependent.

In general, the IC operations must be performed in a specific (but not commutative) order. A collection of consequence operators, cannot be combined together and preserve the requirements that the results appear randomly produced. The IC operators that yield characteristics for biological mutations can be combined correctly because of the commutative property. These special IC operators also share one of the most desirable features for mathematical theories.[7] However, the commutative property does not indicate the 'degree' of variability in the characteristics produced. From a scientific viewpoint, discovered or implied natural laws or processes would yield such limitations.

Consequence operators also model 'random' behaviour that is expressed in the language of probabilities or distributions. Take as a concrete example the modern theory for partial reflection.[8] The source for a reflection experiment is a 'photon' generator. The events that occur are either: 1) a photon appears to be reflected at a certain detectable angle from the surface of a piece of glass or, 2) the photon is not so reflected. This theory predicts that the reflection event will occur with a certain probability p. Even if there was no theory, one might also conclude from empirical evidence alone that this is still the case.

What has been shown[9] is that the assumption that such behaviour is random in character requires the same commutative relation to hold for the set of consequence operators that models this natural-system behaviour. This, once again, is an **implied** signature that this behaviour is designed. This signature, however, gives no indication as to **how** probabilistic behaviour is achieved. Can it be

established that all such behaviour is designed **specifically** by a higher intelligence? This question is answered below where recent results are discussed, results that indicate that it is rational to assume that a higher intelligence designs, produces, co-ordinates and sustains such behaviour.

Indirect evidence

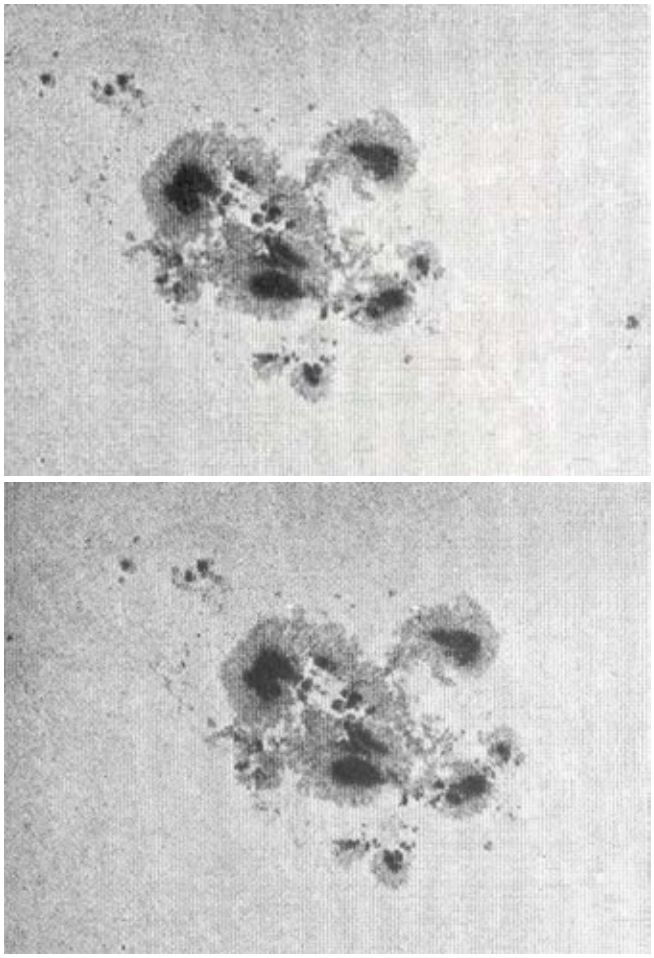
A vast amount of what passes for science today is not based upon evidence that directly impinges upon human or machine sensors. In this article, I term all accepted physical objects or scenarios as **invisible** if they cannot so be detected. For **indirect evidence**, the invisible objects or scenarios are assumed to have intermediaries that do directly impinge upon human or machine sensors.

I have no intention of defining the notion termed 'science'. The reason for this is that there are 'science-communities' that have different procedures that they term as 'scientific'. What appears in this article is not laboratory science. Some would claim that for this one reason, it is not science. But then much of the work in mathematics, theoretical cosmology, astronomy and quantum physics would not be termed as science by a science-community of laboratory scientists although there are thousands of papers published in established scientific journals and considerable money spent to produce such theoretical constructs. Hence, if you consider as 'science' discussions of the claimed 'inflationary expansion' of our universe and, indeed, much that might have occurred within the first few thousands of years of this expansion, assuming that there was a 'beginning', then what appears here is science. Note that 'everything' that exists today is indirect evidence for this type of early history behaviour.

And, consider the time and effort being put forth in the search for a theory of 'everything' that is acceptable to a science-community. Can there be any laboratory support to differentiate between two theories that predict 'everything'?

At the other extreme, there is the famous Everett-Wheeler-Graham multi-worlds interpretation of a certain aspect of quantum mechanics formalism that is considered as science by many who still adhere to this theory. The formalism is a formal series of terms within the mathematical portion of this physical theory. The problem has been how this series is interpreted physically. Unfortunately, the multi-worlds interpretation states that it is impossible to have any evidence, of any kind, that reveals that any of these 'other' worlds exist. They are all totally invisible from one another.

Explanatory 'scientific' theories, such as those mentioned and hundreds more accepted by various science-communities, must include a comprehensible language, must be developed through strict rational thought processes, as usually expressed by mathematical theories, must follow the strict formal rules for theory construction and, when possible, explain why natural-systems behave in observable ways. Usually, this is **indirect evidence** for theory premises, especially for theories that have no laboratory support.



An alteration in observed sunspot location due to the sun's rotation.

It is often claimed that 'science' cannot establish the existence of a spirit being. When this statement is investigated and compared with the previously mentioned theories, it is found to be rather untrue. The results in this article demonstrate that the major reason that most science-communities reject the notion of an invisible spirit being as a first cause is based upon an *ad hoc* definition for what constitutes the **physical universe**.

Although an explanatory theory is constructed using all of the accepted methods, the theory is rejected since the premise selected is not a member of some science-community's stated list of physical, yet, invisible objects or scenarios. I consider the fact that a science-community has not included certain invisible premises or predicted objects as part of their list of physical objects of no scientific significance. As long as all of the basic rules are followed for theory construction; as long as the assumed invisible premises or scenarios predict natural-system behaviour and they are verified through the application of indirect evidence; then the existence of the premises or scenarios

is just as viable as the existence of an inflationary cosmological expansion, the zero point radiation field and many other invisible and science-community defined 'physical' notions. This *ad hoc* rejection is demonstrated by means of the **interpretation** of terms in a mathematical theory. An interpretation, in this sense, is a consistent correspondence between mathematical symbols and terms or phrases from a discipline. If there is more than one possible interpretation and specific evidence does not verify a specific interpretation, then one needs to use other, non-scientific, means to make a reasoned selection or rejection.

Falsifiable theories

Although there appear to be some accepted theories that are not falsifiable, the use of consequence operators as models for natural-system behaviour is not one of them. There is a way to generate and analyze consequence operators based entirely upon a fixed set of rules or procedures.[10] For example, assume that Bob has three premises A, B and D. He is interested only in empirically obtained evidence for a law of nature and does not use a presupposed theory. He repeats his experiment 252 times and each time he uses A and B the only result is C. He then uses as a premise D. He conducts 525 experiments using D and each time the only result is E. Bob's results generate an operator *B* that satisfies all of the requirements for the 'finite' consequence operator.[2] When this operator is constructed, the premises are considered as part of the conclusions. These are later removed by a means of a special process or simply by considering only those results that are distinct from A and B. This is a significant process for all known forms of formal deduction. Bob's consequence operator is defined on a large language that includes the statements A, B, C, D, E. When Bob applies *B* to {A,B}, the result is {A,B,C} or $B(\{A,B\}) = \{A,B,C\}$.

Now consider Ray who also performs experiments but at Moon Station. He conducts his experiment 252 times and each time he uses A and B the only result is D. The generated Ray consequence operator *R* is also defined on the same large language that contains A,B,C,D,E. Symbolically, $R(\{A,B\}) = \{D\}$.

Bob and Ray's experiments are **separate** experiments. From a pure technical viewpoint, for one type of combined experiment, all premises and **all** results are combined together by applying each consequence operator separately to the set {A,B} and simply stating that the experimental results yield {A,B,C,D}. However, using the actual empirical results along with the rules that generate each separate consequence operator, there is no consequence operator defined on the same language that yields this result. For assume that such an operator *K* exists. Then *K* applied to {A,B} must yield, using *B* and *D*, the result {A,B,C,D}. But, by axiom $(1)^2$ of the definition, we must have that for a second application of *K* to {A,B,C,D} the result is {A,B,C,D}. However, applying the Bob and Ray evidence to {A,B,C,D} yields {A,B,C,D,E}.

Thus, it is possible to state experimental scenarios that falsify the consequence operator as a viable model for natural-system behaviour. Of course, there may be many reasons that there is no such consequence operator. For example, the behaviour may follow a philosophic dialectic. Or, additional rules of inference are needed that have not been discovered as yet if our observation of natural-system behaviour requires the behaviour to be humanly comprehensible from the consequence operator viewpoint. What this does is to falsify consequence operator theory in the sense of Popper. This requires a description for a possible experimental scenario be given that demonstrates that a particular natural-system does not follow a rational pattern as dictated by the methods used to generate consequence operators. This example also indicates that it is not a 'simple' task to unify physical theories.

Ultralogics

There are, at the least, two interpretations for standard consequence operators. In the area called 'quantum logic', operators that satisfy some basic aspects of human rational thought are used to model physical processes. The same general approach can be used with consequence operators. For example, a description X for a natural-system is substituted for an objectively real system. Say X is a complete description for a single biological cell obtained using a specific biological language. The description can include an actual 'image' as it might appear in a microscope. A specific consequence operator 'operates' upon this X and yields another description Y for a new natural-system or an altered natural-system. In this case, the Y includes the additional statement that the cell has divided into two cells as well as an image showing this result. The consequence operator can be so constructed that it contains within its rules of construction the natural laws or processes that would affect such a system X and the rules for a standard scientific argument that lead to the system Y. Hence, as with many other mathematical operators, the consequence operator mathematically takes the place of the actual coalescing of the appropriate natural laws or processes that lead to the natural-system Y. This is **(1)**: the materialistic or physical interpretation for consequence operators.

Since consequence operators also model human modes of intelligence, there is a general interpretation that uses the language associated with 'intelligence' and 'intelligent agents'. This is **(2)**: the notion of 'apparent intelligence' and 'apparent design' as such design follows from such intelligence. This important idea is related to the self-reference universe and is discussed more fully elsewhere.[11] It is a physical notion closely related to (1) and how humans mentally develop and perceive and comprehend natural processes. The interpretation **(2)** does not apply **directly** to the concept of a 'higher intelligence' as discussed in this article.

For any form of standard mathematical analysis that identifies natural-system behaviour as having an apparent intelligent design, there is an external interpretation. This theological interpretation states, as identified by these standard methods, that there is a special intelligence being displayed by the design of the natural-system. This displayed intelligence is assumed to be a signature of an immaterial source for such behaviour. However, without theological or personal evidence this interpretation cannot be differentiated from (2) and the use of the term 'immaterial' may lead to a strong rejection.

The actual mathematical theory used in this research **predicts** the behaviour of natural-systems based solely upon standard mathematical axioms, the consequence operator axioms, the human mental activity termed **choice** as represented by an operator or function, and nothing else. No additional hypotheses are added to force, in any manner, the theory to 'predict' any pre-selected result. The non-interpreted mathematical theory's major contribution to general design theory is not that more attributes for standard consequence operators are discovered but rather entirely distinct types of consequence operators are discovered. These **special operators** are **more powerful** than the standard ones[12] and are called **ultralogics**. They can model an ultra-mental process or a **higher intelligence**. The 'more powerful' and 'higher intelligence' ideas are based entirely upon a mathematical comparison with a standard consequence operator from which an ultralogic may be generated.[13] There are ultralogics that are not generated from a standard consequence operator, however, and their properties still indicate that in comparison with mental processes modelled by standard consequence operators these **pure** nonstandard consequence operators are 'more powerful' than any standard consequence operator.

To determine whether these special operators should be interpreted by such terms as 'higher, stronger, infinitely, powerful', and similar comparatives, a strict comparison is made with the standard notions. If one of these special operators applies to a much larger language than that of a standard operator, it can carry such an identifier. If additional results are obtained by application of these special operators, results that cannot be obtained by application of the standard operator, such adjectives are used. If a special operator designs a process and the process involves other special operators, then such a process is also identified by such comparatives.

In general design theory, ultralogics and choice operators have three distinct interpretations. These three can also be consistently combined. If standard consequence operators generate ultralogics, then the standard consequence operators are but the **restrictions** of the ultralogics to the natural universe. These restrictions then have the standard interpretation defined above.

i. These special operators are merely 'higher forms' of only partially comprehensible physical-like laws or processes that are being applied in a sub-quantum region that is exterior to our specific 'natural' universe. This sub-quantum region is contained in the nonstandard physical world.[14]
ii. These special operators correspond to objects with behaviour patterns that mirror behaviour that can most easily be described as the behaviour one would associate with powerful intelligent agents. They can be interpreted as displaying differing levels of intelligence; a fundamental intelligence that designs, produces, coordinates and sustains all natural-system behaviour. The actual objects that display such behaviour are not defined specifically but are considered as fundamental or primitives and, hence, require no further delineation. Terms such as 'intelligence', 'intelligent agents' or 'higher intelligence' are technical terms used only to aid in determining mathematical relations and comprehension. (If the following type (III) interpretation is not applied, then, when possible, restrictions of these higher forms can be assumed to be but an 'apparent intelligence'.)
iii. These special operators represent a higher form of intelligence that represents the behaviour patterns one associates with an infinitely intelligent deity.
iv. Often a consistent combination of these three interpretations is an aid to human comprehension.

There is one other form of intelligence that is added to each of the above three interpretations, the 'metalogic' intelligence. Metalogic is an unspecified and informal form of mental activity that is used to investigate standard and nonstandard consequence operators and associated concepts. The position that this form of intelligence takes, in the above hierarchy of different levels of intelligence, depends upon the mental activity being investigated. If only standard mental activity is studied, then the metalogic is considered a standard mental activity. If metalogic is used to investigate the properties of these special nonstandard operators and other associated mathematical objects, then necessarily the metalogic is interpreted as a 'higher intelligence'. Consequently, in this case, this metalogic is comparatively identified as a special operator.

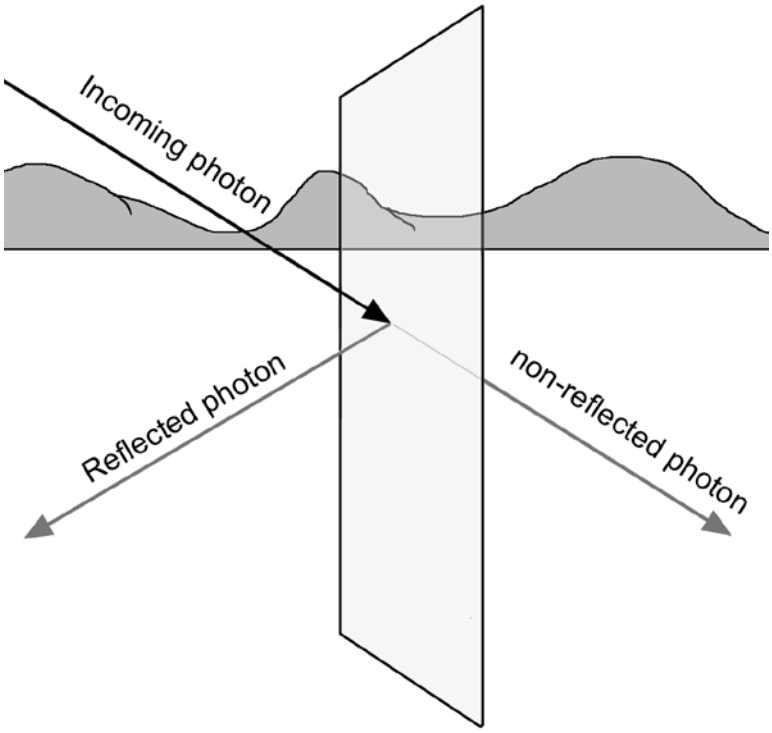
Modelling probabilistic statements

Since this article is written for a specific audience, the terminology used only includes a few linguistic constructions that point to the (I) interpretation. For example, if P_p denotes an ultralogic, then an expression such as 'P_p is an intrinsic ultranatural process that alters the natural-system X' is used sparingly. For this article, when an expression such as 'intrinsic ultranatural process' is used it means a hidden process within the sub-quantum region. For our prototypes, two different natural-systems are used. The first type of natural-system behaves in the same probabilistic manner as the photon generator, photons, and a reflecting piece of glass. The second type behaves in the same probabilistic

manner as an object that is radioactive.

As pointed out, the behaviour of the first or second type of system may be predicted by a physical theory. However, the results presented here do not depend upon such a theory and apply equally well to empirical evidence. For the first type of natural-system, a specific event, reflection of a photon, will occur or will not occur (the photon is scattered). The frequency function that measures the number of events that occur over a specified interval (of time in this prototype case) with respect to the total number of trials (photons generated) is known to converge to a specific value *p*. This is a measure of the probability that a single event will occur and is a well known interpretation.

What is not well known and requires proper comprehension is a fundamental aspect of the discipline 'Mathematical Logic'. Aspects of human mental activity as displayed linguistically on different levels are investigated mathematically. (1) 'I think.' (2) 'I think about my thinking.' (3) 'I think about my thinking about my thinking.' A level (3) intelligent agent designs relations between level (2) intelligent agents that led to level (1) 'thinking'. Then the level (3) intelligent agent uses these level (2) agents itself to yield level (1). By comparison, the level (3) agent can be considered as a 'higher' intelligence and the level (2) and (1) are but manifestations for this level (3) intelligence. In what follows, this additional interpretation can always be applied to statements that use such terminology.



A photon arriving at a glass pane may be reflected, or pass through. Even though the direction it takes is observationally random, the process that determines which direction it takes is an ultranatural process that has been created by the Creator.

For the first type of probabilistically behaving natural-systems, a recent result[15] has the following type (II) interpretation.

(A) For each probabilistically behaving natural-system, a higher intelligence *H'* has designed a specific process that yields its behaviour in the following manner. For a specific interval of application, a higher intelligence **C* selects a powerful intelligent agent P_p that produces the behaviour and co-ordinates the occurrence of every event. The intelligent agent P_p decides, for each trial, whether the event will or will not occur. The agent P_p sustains this behaviour since its 'decisions' are independent from the actual number of trials. For this natural-system behaviour, if the frequency function is calculated for a finite number of trials, it will appear to converge to *p*.

One important fact is that the ultralogic P_p that models this behaviour, when restricted to the natural world, has the same 'hidden' commutative property that identifies the behaviour as being 'random' to an observer. Of course, it is hidden only to observers who do not accept the existence of these modelled intelligent agents. These results also include the empirical fact that different trial intervals usually generate different frequency functions that still appear to converge to *p*.

Feynman has stated that what has just been described for partial reflection, probably, cannot be rigorously obtained by scientific means.

> 'I am not going to explain how the photons actually "decide" whether to bounce back or go through; this is not known. (Probably the question has no meaning.)'[16]

The question does have meaning but an explanation is not found within the language of quantum electrodynamics. From a much different viewpoint, Feynman could have used interpretation (I) and have stated the there is a higher form of law of nature or process that makes this decision and 'forces' the photons to follow the law's requirements and, thus, solve one of the greatest mysteries of physical science. Of course, that is exactly what so-called natural laws or processes do. There is within 'nature' 'something' that 'forces', so-to-speak, objects to follow approximately the behaviour dictated by such natural laws or processes.

Interpretation (A) can be restructured using (IV), a combination of (I) and (II).

(B) For each probabilistically behaving natural-system, a higher intelligence *H'* has designed a specific intrinsic ultranatural process that yields its behaviour in the following manner. For a specific interval of application, the intrinsic

ultranatural process $*C$ selects an intrinsic ultranatural subprocess P_p that produces the behaviour and co-ordinates the occurrence of each and every event. This subprocess P_p produces, for each trial, a fixed specified event or a differentiating event. The process P_p sustains this behaviour since its productions are independent of the actual number of trials. For this natural-system behaviour, if the frequency function is calculated for a finite number of trials, it will appear to converge to p.

In order to make (B) absolutely secular; a method introduced by Feynman can be used. Feynman writes about an object he calls 'Nature'.

> ' … I am describing to you how Nature works. You won't understand why Nature works this way. … I can't explain why Nature behaves in this peculiar way.'[17]

Hence, simply substitute for the first sentence in **(B)** the sentence, 'For each probabilistically behaving natural-system, Nature has designed a specific intrinsic ultranatural process that yields its behaviour in the following manner'.

For the second type of probabilistic behaviour, the events appear to be random but they also follow a specific statistical distribution. In the case of radioactive decay, this is a Poisson distribution. Such behaviour, in actual practice, follows a probability mass function for discrete information that is approximated by the discrete Poisson distribution, when a large number of trials are considered. Actually, there are only finitely many cells or intervals over which the events are distributed within any specific natural world physical scenario. Many times, but not always, the cells are time intervals, which is the case for radioactive decay.

These recent results applied to a statistical distribution yield a similar type of 'intelligent design' description.

(C) For each natural-system that displays a 'statistical distribution' behaviour, a higher intelligence H' has designed a specific process that yields its behaviour in the following manner. For a specific interval of application, the higher intelligence $*C$ selects a powerful intelligent agent P that produces the behaviour and co-ordinates the occurrence of every event. The powerful intelligent agent P decides, for each trial, whether the event will or will not occur in a particular cell or interval. The agent P sustains this behaviour since its 'decisions' are independent of the actual number of trials. For this natural-system behaviour, if frequency functions are calculated for a finite number of trials and for each cell or interval, the functions will be approximated by a specific mass distribution function.

Perturbations

Some individuals consider probabilistic models as not Scriptural. They assume that the term 'random' somehow contradicts the Scriptural implication that God is continually in control. This research has shown that if interpretation (III) is applied, then this is definitely not the case. The Scriptures use linguistic notions to describe God's creationary and sustaining activities. 'And God Said, Let there be … .' General design theory models repeatedly support many Scriptural statements, not merely the creationary statements contained in Genesis 1 and Hebrews 1:3.[18] The notion that probabilistic behaviour is less 'perfect' than classical behaviour has also led some to develop classical models that predict some of the probabilistic behaviour. In contrast to these philosophic beliefs and under (III), this research indicates that probabilistic behaviour is a signature for an exceptionally remarkable Divine control, a control that cannot be duplicated by His created. A probability model could 'perfectly' predict natural-system behaviour. Hence, I accept that this is how such a natural-system was originally designed to behave.

The Scriptures plainly teach,[19] due to the introduction of sin, that God's material creation is deteriorating and no longer conforms to its original perfection. How does this clear teaching fit with a type (III) interpretation for probability models? The facts are that we do not know whether a probability model used to measure behaviour as observed today is the original or a corrupted model. Did the rate for radioactive decay follow a Poisson distribution 5,000 years ago? More significantly, however, is that probability models are often very approximate in their predictions. The entire basic notion is that 'infinitely many' trials are needed before one is sure that the probability model is accurate. Further, there are event sequences that 'converge' very, very slowly to the models predictions. A significant fact, however, is that what is discussed here is but one aspect of general design theory.

In a future article, the most recent of all discoveries that there are ultralogics that unify any collection of physical theories will be discussed. And, this result is independent of whether such theories are deductively or inductively obtained from empirical evidence. This unification includes probabilistic behaviour as well. This discovery adjoined to one made many years ago[20] indicates how God may allow for such material deterioration. It is through the process of **perturbation**. These new and old general design theory results under a type (II) or (III) interpretation show specifically that a higher intelligence has designed all of the original natural-system behaviour in such a way that various degrees of perturbation from the 'perfect' are allowed. For general design theory, it is the allowed perturbations that produce the deteriorating aspects of our physical universe that correspond to the Scriptural notions.

Conclusions

It has been claimed that much 'chance' behaviour is not intelligently designed.[21] This claim refers to a restrictive design concept termed 'specified complexity' and an intelligence that appears to be associated with this special form of design. This intelligence can only be of the same strength as human intelligence, the intelligence that rec-

ognizes that such a 'design' satisfies a restrictive design definition. The results discussed above refute such claims if the higher intelligence interpretation is accepted. They 'explain' probabilistic behaviour, in the same sense that various cosmological theories 'explain' what occurred during the first few moments after the beginning of expansion, and indirect evidence verifies an individual's choice of an interpretation. Indeed, one does not need to choose any of the three or any combination, although this may leave certain interesting questions unanswered. Since these results are based upon strict interpretations for mathematical objects, they can only be refuted if uncorrectable errors are found within the mathematics.

Many years ago, I considered a vast array of observed chance events, especially those that occur under ordinary circumstances, as not designed and not attributable to an intelligent agent. Clearly, such beliefs depend upon an observer's knowledge and experience. Now, however, knowledge of the intelligence modelled by the H', $*C$, P_p and P operators allows me to recognize that all probabilistic chance behaviour is designed by a vastly superior intelligence than I display.

The Scriptures use linguistic concepts that are associated with what we measure as mental ability to model the creationary power of God. The Scriptures often compare the attributes of God with those of His Creation and this is especially so relative to implied differences in 'mental ability'. Hence, interpretation (III) is significant for individuals who believe in the literal Genesis 1 creationary scenario. In particular, these mathematically generated results specifically imply that interpretation (III) is rational and is based upon the same principles for theoretical inquiry as used throughout various branches of today's 'science'.

Thus, as summarized above, if one assumes that natural-system behaviour is predictable by means of theory or empirically generated probabilistic statements, then such behaviour can also be categorized and interpreted as yet another display of the wondrous workings of the infinitely powerful mind of God.

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