

**PAUL EWART**

## The Necessity of Chance: Randomness, Purpose and the Sovereignty of God

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*Chance in creation is discussed in the context of purpose and meaning and its implications for the sovereignty of God. Disorder and chaos arising from chance are often seen as destructive and randomness per se as evidence that there is no purpose in the universe. Using examples from physics it is argued that chaos can be constructive. Chance is also shown to be consistent with meaning and purpose. By considering chance in theodicy, the randomness in the distribution of suffering, it is argued that chance is necessary both to allow human freedom and to preserve God's sovereignty. It is concluded that chance has an important role in creation but exists also for a theological purpose. At the creative level random events provide a robust method to explore the range of possibilities allowed by physical laws. This interaction of chance and necessity is the mechanism of evolution. On the moral level the inability to predict outcomes creates a freedom to act that establishes real moral responsibility. At the theological level the inability of humans to predict outcomes in the presence of chance prevents us from exploiting the consistency of God and preserves his sovereignty. The conclusion is that chance is a necessary part of God's creation in which creatures are allowed free will. As a result of this conclusion a refined definition of sovereignty is offered in which God retains an adequate degree of control to effect his will whilst allowing genuine chance to operate and in which he is involved at a detailed and personal level.*

**Keywords:** chance, randomness, purpose, theodicy, human freedom, sovereignty of God

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### Introduction

Nature is random. Cloud shapes, arrangements of pebbles on a beach or mosses and lichens on a woodland floor, the turbulent flows of mountain streams and the flickering forms of flames all display an inherent randomness. Nature rarely draws a straight line. The success of the scientific enterprise has been won by the expedient of ignoring this most obvious characteristic of the natural world. Physics in particular works because its theories involve simple models that have no randomly varying parameters: its experiments are deliberately designed to exclude everything except predictable factors. By so doing it identifies laws of nature that express the regularity and consistency of the world. The random motion of atoms although recognised was also tamed by the

invention of statistical mechanics. Order was restored by showing that randomness at one level could nonetheless lead to regular laws at another. The science of statistics and probability theory brings an element of predictability to chance happenings when large numbers of such events are considered. The advent of Chaos theory however illustrates the more recent trends in science to address seriously the issue of randomness in nature. There is also a growing recognition that chance may be a genuine feature of nature and not simply an expression of our ignorance about causes.

Philosophy, theology and literature have also struggled to make sense of what appear to be chance events in life. From Boethius to Calvin the issue has been how to reconcile chance and the sovereignty of God. Christian philosophy has generally sought to deny a determining role for chance, preferring instead to assert God's total control over every event. This approach is typified by Calvin:

There is nothing cheaper than a sparrow... and yet God's eye is upon it, and *nothing happens to it by chance*. Will he then who looks after sparrows neglect to watch over the lives of men?<sup>1</sup>

Chance and states of chaos have been seen in a generally negative light. Chaos may be thought of as a state that changes in an unpredictable way, where what follows seems to arise purely by chance. Creation is viewed as a triumph of order over chaos that parallels the victory of good over evil. Early creation myths described a world made out of formless, pre-existent chaos. The primeval, personified ocean, *Tiamat*, in Sumerian myth was the enemy of the creating gods who sought to impose order and form. The Judeo-Christian version in Genesis sees God, the Holy Spirit, bringing order to 'the deep'.<sup>2</sup> Some have speculated that the Hebrew distaste for seafaring reflected their distrust of oceans subject to chance storms and unpredictable dangers. Even the Sea of Galilee was notorious for sudden squalls that could come out of the blue. Although Jesus was able to sleep through one of these storms, the disciples, who were manning the ship, were unable to have his peace of mind in the face of such seemingly uncontrollable chaos.<sup>3</sup>

## Defining the problem

Mankind's suspicion of chance is however due to more than a desire for security in an unpredictable world. The element of chance in modern physics seems to undermine any sense of meaning or purpose in existence. Cosmology presents a universe of unimaginable scale where it is emotionally difficult to feel that our lives have any significance or purpose. Purpose would seem to require

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<sup>1</sup> Calvin, *J. Commentaries*, 'Providence and Human Action,' p. 265, my italics.

<sup>2</sup> Gen. 1:2

<sup>3</sup> Matt. 8:23-27.

an orderly progression to some end or goal. The universe however appears to be operating under a principle of increasing disorder from the smallest to the largest scales. Accidental or random events such as atomic collisions tend to destroy order. Entropy, the quantified measure of disorder, according to the Second Law of Thermodynamics, always increases and its inexorable advance gives the direction of time. And with the passing of time comes inexorable decay. One vision of the future is of an ultimate state of formless, all-pervasive, disorder: the heat death of the Universe. This bleak and cheerless prospect again suggests that existence lacks purpose.

If everything is ultimately the result of mere chance then we are apparently left with an existence without purpose or meaning. This is the thrust of the attack on belief in God by Monod in his seminal book *Chance and Necessity*.<sup>4</sup> He argues that advances in the theory of evolution have brought us to the place where 'Man at last knows he is alone in the unfeeling immensity of the universe out of which he has emerged by chance.'<sup>5</sup> The theme is taken up by more recent writers such as Dawkins<sup>6</sup> and Dennett<sup>7</sup> who argue that the neo-Darwinian explanation of origins based on chance mutations totally undermines belief in God and so there is no purpose in life. 'Natural selection,' writes Dawkins, 'the blind, unconscious, automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all life, has no purpose in mind.' We note in passing that actually all Dawkins and others who so argue have done is to undermine one form of one, not very good, argument for God's existence – the argument from design. (Their conclusion that since this particular argument is invalid God does not exist is, however, a giant non sequitur.)

The argument from design has been revived recently by advocates of what is termed 'Intelligent Design'. Their case involves the assumption that chance can have no determining role in creation since it is inimical to purposive action. In the title of his book *The Design Inference: Eliminating Chance through Small Probabilities* Dembski declares his intention.<sup>8</sup> The argument is based on an assumed property of 'irreducible complexity'. The mere existence of a biological organism with this property that has such a low probability of arising by chance is said to prove the existence of a designer, namely God.

The traditional theistic approach has also been to deny the reality of chance, or to see it simply as an expression of our ignorance of underlying causes. This sits easily with a strong view of God's sovereignty. In this view there are no random events, everything is under the complete control of a sovereign God.

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4 Monod, J. *Chance and Necessity*, London: Collins (1972).

5 Monod, J. *op. cit.*, (3).

6 Dawkins, R. *The Blind Watchmaker*, London: Penguin (1988).

7 Dennett, D. *Darwin's Dangerous Idea*, London: Simon and Schuster (1995).

8 Dembski, W. *The Design Inference: Eliminating Chance through Small Probabilities*, Cambridge: Cambridge University Press (1998).

The apparently chance nature of events is an illusion. The reality, it is claimed, is that nothing happens without God's knowledge and intention. The lifetime of a particular sparrow and, by extension, of a particular nucleus, is determined by God's will.<sup>9</sup> The question seems to be 'Would a good designer leave anything to chance?' and the answer from atheists, most theologians, Dembski and other more explicitly Creationist writers is 'No'. The answer that I offer here is instead a qualified 'Yes'.

The challenge to belief that arises from chance in creation has been taken up by a number of writers. In particular Peacocke counters Monod's arguments (and hence also those of Dawkins, Dennet et al.) by admitting the role of chance in evolution but recognising that there is more to be said about it that can easily accommodate purpose.<sup>10</sup> A comprehensive review of the subject of chance in relation to God has been presented by Bartholomew.<sup>11</sup> In particular he addresses Monod's scientific arguments and shows that they do not provide adequate justification for his metaphysical conclusions. In a more recent book Bartholomew, as an expert in probability theory, exposes the fallacies underlying the Intelligent Design argument, in particular the circularity inherent in the definition of what is statistically significant.<sup>12</sup> The central conviction expressed in both Bartholomew's books cited here, and shared by the present author, is that chance is both real and has a creative role to play in achieving God's purposes. 'Chance has to be seen as within the providence of God. It is not something that requires the abolition of theism nor is it an illusion.'<sup>13</sup> The cost of this acceptance of chance in Creation is some weakening of the concept of God's sovereignty. The extent of this weakening will be examined in more detail later.

The context of the present paper may thus be defined by the way chance has been seen by some atheists and theists alike. From the atheistic perspective chance eliminates any purpose and therefore the existence of a purposive Creator. From that of the theistic advocates of the design argument, chance rules out a Designer God. It seems also that most classical theological approaches have tended to deny the reality of chance in order to preserve the sovereignty of God. If chance is real God cannot be sovereign. In this paper I aim to show that the opposite is the case: God can be sovereign *only* when chance is real! More exactly, I will argue that in a world governed by physical laws in which humans have free will chance is necessary if God is to be sovereign. To make the case I will consider perhaps the most troubling issue in theodicy – the undeserved suffering arising by chance. Theodicy has been mostly concerned with the *existence* of suffering. I will address a related problem that has not received so much attention, namely the *randomness* in the distribution of suf-

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9 Matt.10:29.

10 Peacocke, A. *Creation and The World of Science*, Oxford: Oxford University Press (1979).

11 Bartholomew, D. *God of Chance*, London: SCM Press (1984).

12 Bartholomew, D. *God, Chance and Purpose*, Cambridge: Cambridge University Press (2008).

13 Bartholomew, D. *op. cit.*, (11).

fering. The question of suffering is difficult enough, but what often seems hardest to bear is its randomness and apparent injustice. The prosperity of the wicked and the affliction of the righteous was a paradox to the psalmists and it still puzzles people today.<sup>14</sup> My aim is to show that the chance element in suffering is not just part of the problem but may be a clue to its solution.

Having sketched the background the paper will begin by clarifying the nature of the problem that chance poses for the sovereignty of God. It will be helpful here to give some definitions of terms such as chance, randomness and chaos since they have different meanings and connotations in different contexts. The constructive role of chance is then underlined using examples from physics that complement the already well-known operation of chance in biological evolution. It will then be shown that meaning and purpose are real and not illusory even when chance events or processes are involved. The randomness in the distribution of undeserved suffering is addressed by considering the consequences of eliminating chance from the world and the knock-on effects on freedom of action. It will be shown that chance is necessary to guarantee God's sovereignty and to limit the effects of human, freely chosen, evil. Finally the nature of God's action in a world of chance is considered such that both human freedom and God's sovereignty are preserved.

### Chance, suffering and the sovereignty of God

The existence of suffering poses for many the most challenging difficulty for belief in God. As we have noted, the problem is made worse because of the random way it is distributed that seems to bear no relation to what people deserve. In his popular and famous book, *When Bad Things Happen to Good People*, Rabbi Harold Kushner, speaking from experience of suffering in his own family, recognises the reality of chance, accepts that people suffer for no reason and concludes that God is not omnipotent.<sup>15</sup> God is therefore not in complete control and his sovereignty is seriously compromised. This approach to the problem, accepting that God is not sovereign in the sense of being able to control events, has not gone unchallenged. Rabbi Yitzchok Kirzner points out that if we try to retain the benevolence of God by dispensing with his omnipotence, God becomes irrelevant to our lives.<sup>16</sup> Specifically, 'If he is not responsible for the bad, neither can he be credited with the good' and all hope of meaningful comfort is lost.

It could be argued that God could still be almighty but may have chosen to relinquish control over his creation. The difficulty that arises if God is not sovereign, either by choice or through impotence, is that he has created a world where evil and suffering could spread without restraint. The exercise of such

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<sup>14</sup> See e.g. Psalm 73.

<sup>15</sup> Kushner, Rabbi H. *When Bad Things Happen to Good People*, New York: Schocken Books (1981).

<sup>16</sup> Kirzner, Rabbi Y. *Making Sense of Suffering: A Jewish Approach*, New York: Mesorah Publications (2002).

creative power, without retaining responsibility, seems to me to be inconsistent with love. It is surely not the action of a loving God to create beings, like us, who would be subject to randomly inflicted pain and disaster beyond his control. So it is important then, if God is to be both all-loving and all-powerful that he retains some *adequate* degree of sovereignty over his creation. The omnipotence of God, of course, has to be understood as excluding logically incompatible properties. Theologians have always been clear that God cannot simultaneously grant and deny free will to humans. The question we are exploring here is how the sovereignty of God is to be maintained in a world operating under natural laws but subject also to chance and in which humans exercise free will. The interplay of these three factors can be expected to create situations that will be hard to understand in detail. God's sovereignty in such a complex mix may turn out to be more subtle than previous simplistic accounts have allowed for.

The specific question facing us is, 'How can God be sovereign if random events occur?' The answer proposed here, that God can be sovereign *only* when random events occur, will involve a revision of what is meant by sovereignty. In this view chance does not exist as an accidental by-product in Creation so that God has to intervene periodically (i.e. very often!) to put things right. On the contrary, God may have intentionally made a world where chance plays a positive and creative role. This would apply not only to the world in general but also to particular events that we experience personally. If we can appreciate that chance fulfils an essential role it may help us live with it in gratitude rather than resentment. The question posed by the book of Job is essentially 'Who is in control here?' One suggestion that God made to Job was that he adopt a different perspective. In the end seeing things in a different way didn't answer all Job's questions. Neither will it answer ours, but it may help us live more at peace knowing that, in principle, there may be an answer consistent with the sovereignty and love of God. When Jesus said that the rain falls on the just and the unjust alike, I always took that to mean bad things happen to good and bad people equally. That was because I grew up in Ireland, where the rain always interfered with my playing outside. I saw rain in a negative light! In a hot and dry country like Israel, however, the rain falling may be a picture of *good* things coming to good and bad alike. A change of perspective is sometimes helpful.

### **Chance, randomness and chaos**

Words like 'chance,' 'random' and 'chaos' have meanings, and carry connotations, in everyday usage that are not always appropriate when they are used in a scientific context.<sup>17</sup> For the present purpose the word 'chance' is used to

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<sup>17</sup> For helpful introductions to some of the technical concepts see, e.g. Gleick, J. *Chaos*, London: Heinemann (1988); Gribbin, J. *Deep Simplicity: Chaos, Complexity and the Emergence of Life*, London: Allen Lane (2004).

describe events that have no discernable cause and so are inherently unpredictable. 'Chaos' is a disordered state that arises when things are left to chance. It is a state in which the details could not have been predicted from knowledge of a prior state and in which future states are similarly unpredictable. Within science there are at least three aspects of chaos to be considered. 'Chaos' may be deterministic or non-deterministic or a chaotic process may be so because it is just too complicated to predict. The first sense applies to processes that begin with some initial condition that is changed by a well-defined operation yet results in an effectively unpredictable jumble. For example, something with a specified value may be changed in an ordered way, defined by a simple mathematical equation, such that successive operations of the same type lead to a chaotic result. Such deterministic chaos results specifically from a nonlinear process subject to feedback. The reason for this unpredictability is that it is impossible to specify the initial condition, and the subsequent changes, with sufficient precision to be certain of the outcome. The cumulative effect of small uncertainties in each step leads, after many such steps, to a very large uncertainty. Nonlinear processes are capable of amplifying small differences to an alarming degree. This is the, now famous, process whereby a flap of a butterfly's wing in Brazil supposedly leads to a hurricane in Florida. A second type of chaos, non-deterministic chaos, is thought to arise in dynamical systems that pass through, or close to, singularities. Such systems make unpredictable jumps when subjected to even small, but random, perturbations near the singularity. In practice it is difficult actually to find examples of such chaos that can be unambiguously identified as non-deterministic. Thirdly, effective chaos may arise in a non-computable process, that is, a process that cannot, in practice, be calculated. The results of such processes are random and this randomness is due to the impossibility of calculating the outcome owing to the inherent complexity of the process. Problems can be posed that no conceivable computer could calculate in any finite time.

So there exist subtleties within chaos itself. It may be due to strictly deterministic sequences where imprecision in initial conditions makes the result unpredictable. In non-deterministic systems the unpredictability arises from small random perturbations near critical points. Unpredictability may also arise owing to our inability to calculate the outcome of complex processes. The key feature, for our purpose here, is that the outcomes for any chaotic process are unpredictable and cannot be controlled with certainty.

The word 'random' also carries different meanings. It, too, has subtleties that often lie hidden if we are careless of the context. Sometimes 'random' means uncaused, or without any *apparent* cause – the latter qualification may be significant! Quantum fluctuations are uncaused and random in this sense. At other times it means simply uncorrelated but this too may be only apparent and based on the criterion selected to define the correlation. Random fluctuations occur everywhere, from rises and falls of the Share Index on the Stock Market to rapid variations in the electric current flowing in our music systems, that we call noise. Again, a key feature of randomness is that what happens

next cannot be predicted with certainty from what has gone before.

The various types of random processes or states of chaos may be said to arise by chance. This is not to say that there is no cause but that the causal links, if they exist, cannot be established with certainty. There may also be, as far as we know, some events that have no cause that we are able to determine even in principle. Examples of such radically uncaused events include decay of radioactive nuclei or some other quantum processes. These are due to what Bartholomew terms 'pure chance'.<sup>18</sup> Whatever the underlying nature of chance may be, in practice the important feature is that it means unpredictability.

### **Constructive effects of random processes**

Having clarified some of the terms we now return to the task of finding a different perspective on the issues that may give insight to the problem. The usual view, as noted above, is that chance and randomness tend to destroy order and so undermine purpose. It may be helpful to gaining a new perspective to go back to the beginning. There is a way of interpreting the Genesis creation story that marks it as differing in an important way from other creation myths. Whereas the Babylonian and other cultures envisaged a pre-existing chaos that was tamed by a creative deity, the Genesis account is of creation from nothing – in the beginning there was not even chaos! On the contrary, it is implied that the primeval chaos was created as part of the process. For the Hebrew people 'the waters' or 'the deep' was a picture of disorder and danger. In Genesis 1:2 the first stage of creation describes a state devoid of structure and form. This suggests that chaos was intended to play a creative role. It is now well known that order can grow out of chaos in certain circumstances. The work of Ilya Prigogine and others on thermodynamics of systems far from equilibrium demonstrates that energy flows into chaotic systems can lead to self-organisation and ordered structures.<sup>19</sup>

The rehabilitation of chance begins by recognising the constructive role played by random events in evolution. The role of chance as a driver of evolution is widely accepted by both theists and atheists alike. Evolution, as is eloquently explained by writers such as Jacques Monod,<sup>20</sup> Daniel Dennet<sup>21</sup> and Richard Dawkins,<sup>22</sup> proceeds by the fruitful interplay of chance and necessity. The space of possibilities is explored by systems subject to random variations and successful outcomes are defined by natural selection. This process can be comfortably accommodated within a theistic world-view.<sup>23</sup> Arthur Peacocke has

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18 Bartholomew, D. *op. cit.*, (11).

19 Prigogine, I. and Stengers, I. *Order out of Chaos: Man's new dialogue with nature*, London: Flamingo (1984).

20 Monod, J. *op. cit.*, (4).

21 Dennett, D. *op. cit.*, (7).

22 Dawkins, R. *Climbing Mount Improbable*, New York: Norton (1996).

23 Polkinghorne, J. *Science and Creation*, London: SPCK (1988).

argued that the operation of chance in evolution is entirely consistent with a creative purpose. It is seen as the most efficient and effective way of realising the potentialities inherent in the nature of the created material: 'it is as if chance is the search radar of God sweeping through all the possible targets available to its probing'.<sup>24</sup> Keith Ward has also argued cogently that since what is possible is constrained, *inter alia*, by the laws of physics, it is certainly possible that a purposeful outcome has been ordained in some sense by the maker of those laws.<sup>25</sup> John Polkinghorne has pointed out the constructive role of 'just the right amount of chaos' in Creation; 'too much and nothing persists, too little and nothing gets created'.<sup>26</sup> This delicate balance sets the destructive tendency of chaos against its creative effect in allowing all possible states to be explored from which new forms of order may arise. I would add, in passing, that it is certainly conceivable that the existence of 'just the right amount of chaos' is another aspect of fine tuning in the universe. This gives a theological insight into the presence of chance in God's universe as fulfilling a positive function. Chance is there for a purpose.

The impression may be gained, however, from theistic acceptance of the presence of chance in creation that it is somehow just an inevitable consequence of the nature of things. It is as though God were constrained by the properties of his own laws of consistency to make the world that had to include chance events. All God could do then was to limit the extent or consequences of this randomness by constant intervention to prevent total chaos! I am suggesting here a slightly more positive view of random processes from a theological perspective. I aim to show how the creative inclusion of random processes provides not only a mechanism for evolution, but also ensures human freedom whilst maintaining the sovereignty of God. This perspective will also counteract the view, expounded by those with an atheist agenda, that randomness *per se* rules out any purpose in creation. At first sight it does seem that the simple fact that chance is involved in the process of forming the natural world, including humanity, proves that there can be no overall purpose in our existence. This superficial observation, however, is not as logically rigorous as it appears.

As a first step in outlining the creative purpose of chance we consider the constructive effects of random fluctuations. Fluctuations have been shown to induce stability in some, normally unstable, mechanical systems. Think of a plate balanced on the top end of a vertical stick. Rapid and random wobbles of the end of the stick can stop the plate falling off by giving it, on average, a wider base on which to sit. Even the most radically random events, quantum fluctuations of a wave, can lead to constructive effects.

The equations describing quantum processes are entirely deterministic. What is determined is the probability which may vary in time in a wave-like

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<sup>24</sup> Peacocke, A. *op. cit.*, (10).

<sup>25</sup> Ward, K. *God, Chance and Necessity*, Oxford: Oneworld (1996).

<sup>26</sup> See e.g. Polkinghorne, J. *Quarks, Chaos & Christianity*, London: Triangle (1994).

manner. The phase of a wave tells us whether it is going up or down at a particular time. Quantum interference is a process whereby an up-going wave is cancelled out by a down-going wave when both waves are equally probable. The two waves in this case have opposite *phase*. When intense laser light falls on an atom, the atom may jump between one quantum state and another by going through one of two possible intermediate states. In the trade this is known as a *resonance* and can lead to the emission of a new laser-like beam of light. The total probability of the process happening involves adding the probabilities of the two paths via the different intermediate quantum states. In some situations the transitions corresponding to the two paths have equal probability but opposite phase and so they cancel out. So long as this timing, or phase, of the waves remains constant then nothing happens. No resonance or new laser-like signal is produced. If, however, the phase is disturbed by random fluctuations of the light or random collisions with other atoms, the cancellation of the probabilities is prevented and the resonance occurs yielding the new light beam. This destruction of destructive interference (a kind of double negative!) leads to a positive emergence of a *resonance*.<sup>27</sup> Such events, previously prevented by the deterministic laws of quantum mechanics, are allowed to occur because of random fluctuations. The precise details of the quantum mechanics are not important to the argument. The point we can take here is simply that random events are not always destructive and can be positively constructive. Specifically the study of stochastic effects at the atomic level shows that the rigid determinism of quantum mechanics may be overcome by random fluctuations. Chance processes may therefore release the universe from the iron grip of determinism.

### **Chance, meaning and purpose**

The question remains, however, as to whether a process involving chance could have any meaning or purpose. Meaning and purpose imply, among other things, information and intention. 'Information' may be thought of as involving a *coherent structure of properties*. A simple example of such a coherent structure is a sequence of on/off pulses of electricity representing ones and zeros in a digital signal. Note that information cannot be reduced to 'nothing but a series of ones and zeros'. A digital signal may appear to be a random sequence of pulses but the information is encoded and needs to be extracted by a higher level process. In a similar way 'intention' may be thought of as involving a *coherent sequence of processes*. An example would be a sequence of thoughts (involving physico-chemical processes) that directs my arm to lift a cup to my mouth. Note again that the 'intention' is more than just the goal-directed actions of my muscles or the nerve impulses that caused them. The conscious

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<sup>27</sup> Prior, Y. Bogdan, A., Dagenais, M. & Bloembergen, N. 'Pressure induced extra resonances in four wave mixing', *Physical Review Letters*, Vol. 46, p.111, American Physical Society (1981).

thought is a kind of higher level process that may superimpose a directed sequence on otherwise randomly firing brain synapses. The incidental point I am making here is that neither information nor intention can be fully explained by reductionist materialism. There is a parallel here with the point made effectively by Bartholomew regarding levels on which chance operates.<sup>28</sup> Statistical laws are reliable only because the randomness at lower levels effectively eliminates biases and, on average, give a consistent performance. Thus, although at one level events are unpredictable and random, seen at a higher level they may form part of a larger scale pattern of behaviour that may be entirely predictable.

Let us now consider first whether a random process can have any information content. A common picture of a randomly fluctuating process is of a graph consisting of a jagged line having, on average, as many up spikes as down. Such a graph may be obtained by displaying an audio recording of noise on an oscilloscope screen. Any up spike chosen at random may be followed by either another up or a down spike. The next spike is unpredictable and this characterises our noise. Noise, however, is not all the same. The frequency of big and little spikes occurring is usually not the same. A recording of the hubbub at a cocktail party, the background noise that makes it difficult to conduct a conversation, will show a random noisy pattern. Similar patterns are shown by recordings of birdsong or even the graphs of earthquake intensity versus frequency! Big spikes are less frequent than little spikes; that is to say, the intensity of the noise is inversely proportional to the frequency  $f$ . Such noise is called  $1/f$  noise and the key point about it is that information is inherent and can be extracted by analysis. Other types of noise do exist, of course, where there is, as far as we can tell, no information content at all.

Secondly let us consider whether intention could be present at some level in a process involving random behaviour. As we noted above 'intention', like information, cannot be described by a reductionist approach. Intention is a property of conscious thought and consciousness is an emergent phenomenon that is enabled only with a certain level of complexity. A full discussion of the relation between a higher level concept such as intention and lower level phenomena that may involve random processes would take us on a tangent too far from our main subject. For our present purpose we need only to show that the mere presence of randomness at some stage in the process does not, of itself, prove that there is no intention operating. The following simple example illustrates the point. When I pump up my bicycle tyre atoms moving randomly in the air are transferred to move randomly inside my tyre. My intention to inflate my tyre was fulfilled without totally or permanently overcoming the random motion of the molecules. A molecule-sized brain inside the tyre observing the random molecular collisions would be hard put to know what was going on! The point here is that the mere existence of randomness does not, in itself, rule out the

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28 Bartholomew, D. *op. cit.*, (11).

possibility of intention. This is consistent also with Bartholomew's concept of levels whereby randomness at one level does not rule out ordered behaviour at a higher level.<sup>29</sup> This is the basis of statistical laws and leads to his idea that God's overall purposes can be fulfilled even in the presence of chance at lower levels.

We have so far established that processes characterised by chance may be constructive. Secondly, we have seen that random fluctuations or noise may carry information which is a prerequisite for meaning. And meaning is, in some sense, necessary for purpose. Furthermore I have suggested that intentionality, also identified with purpose, is not inconsistent with the existence of randomness. What theological significance could this have? In particular, what could be the purpose of leaving some things to chance if God is to be sovereign, in the sense of being in control of events? As we shall see the meaning of sovereignty may have to be qualified and our understanding of the control that God exercises may need refining.

### **Random suffering as a clue to the purpose of chance**

The existence of suffering in the world is a major obstacle to belief in a God. A particularly difficult problem for theodicy is how to explain the random manner in which suffering is distributed. Chance seems to rule out all connection between virtue and reward. We have a feeling that if suffering has to exist at least its degree ought to reflect somehow what a person deserves. This sense is shared by some eastern religions in the idea of *karma*. The randomness of disease and disaster seems to undermine the justice and sovereignty of God.

Rabbi Kushner's answer to this problem is that we have simply to accept that some things happen randomly for no reason and God is powerless to prevent them.<sup>30</sup> David Bartholomew also argues that suffering is genuinely random as a consequence of God's giving chance a creative role to play which also frees the world from determinism.<sup>31</sup> This, at least partly, exonerates God, for in a deterministic world he would be totally responsible for everything that happens. He argues also that the individual sufferer can draw comfort from the fact that he or she had not been 'singled out and is not necessarily more deserving of punishment than anyone else'.<sup>32</sup> Bartholomew's argument is based on the idea that chance operates at different levels allowing purpose to be worked out at a higher level independent of the random goings on below. There are events, accidents and even human decisions that have no real bearing on God's overall plan. This being the case God is willing to let the dice fall where they

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29 Bartholomew, D. *op. cit.*, (11).

30 Kushner, H. *op. cit.*, (15).

31 Bartholomew, D. *op. cit.*, (11).

32 *ibid.*

may without micromanaging every outcome. His sovereignty then rests in bringing to pass his overall aim on a macroscopic scale. The details at lower levels are then not as important as they seem to us. Bartholomew's view has been criticised by Peacocke as one which does not do enough justice to the immanence of God in his creation.<sup>33</sup> The problem of integrating Bartholomew's and Peacocke's recognition of the reality of chance in nature and in suffering with a notion of God's sovereignty will be considered after we establish a possible purpose for randomness in the distribution of suffering. By looking directly at this most troubling aspect I suggest we find a clue to a possible resolution.

Our sense of justice is offended by the chance nature of suffering. Natural justice suggests that what happens to us should be determined by the moral quality of our actions and character. Our intuition is that bad things should happen only to bad people or at least only on their committing bad acts. In other words we demand that the universe operate under moral laws as well as physical laws. The question immediately arises as to which set of laws is to take priority? C.S. Lewis explains clearly the difficulty of granting priority to moral laws.<sup>34</sup> If the moral law takes precedence our brains cells would refuse to form evil thoughts, the air would refuse to carry sound waves representing lies and a wooden chair leg would lose its rigidity if used as a weapon, and so on. The world would become totally unreliable if we exercised any free will. There seems to be no alternative to giving priority to physical laws. And these laws not only allow chaos to develop but have inherently random features at different levels making things unpredictable. Our sense of justice, however, is that it ought to be consistent and therefore, in principle, predictable. This is where the trouble begins for we have seen that the essence of chance is to make things *unpredictable*.

If the visitation of sickness or disaster is not to be left to chance then God must intervene to ensure fairness. God is required to ensure not only that bad things do not happen to good people but that all that happens is commensurate with the moral quality of our actions. It is not hard to imagine that this could easily create situations that would be logically impossible to deal with. Our courts are troubled often with conflicts of rights between equally deserving claimants. A similar problem arises when the church fête organisers pray for sunshine when the farmers are praying for rain! If justice is to be consistent it must also be predictable. We demand the same consequence for the same act. God is by his nature totally consistent, and so must act in accordance with his nature. Thus, for example, God must intervene to protect the innocent every time a person intends to do harm. God's actions must therefore, in principle, be predictable. The problem now arises when free will is exercised. For now God

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33 Peacocke, A. *God and the New Biology*, London: J.M. Dent & Sons (1986).

34 Lewis, C.S. *The Problem of Pain*, London: Geoffrey Bles (1940).

must *re-act* in a predictable way to our actions. God is no longer sovereign!

Chance, however, limits our ability to predict every outcome. For example we cannot calculate all the consequences of our actions. Specifically, we cannot be sure how, or indeed if, God will respond to anything we do. The genuine randomness inherent in nature prevents us from assigning a cause to everything that happens. Hence we cannot identify unambiguously a divine action. As we shall see later God can still work through random processes in a constructive way. For the present the first important thing to note is that chance leaves us morally free to act. Our actions will, of course, still have consequences and some, at least, of these may be predictable. We are however free to choose which outcomes without being constrained by the certainty of some divine intervention.

The second and crucial point is that since we cannot predict we cannot control God. If suffering was the result only of moral evil, God's actions would be, in principle, predictable. Then, owing to the consistency of his nature, he would be forced to act in response to human free-willed actions or intentions. God would no longer be sovereign. It is therefore necessary that chance operates to maintain unpredictability and to prevent us from controlling God. In effect the randomness inherent in the world insulates God from us. Chance must be genuine and not just an illusory cloak behind which God can hide. God can be sovereign only when chance is real. This does not mean, however, that because God's actions are unpredictable by us, they are therefore random. God's power will enable him to adapt his actions to take account of chance and to ensure his will is done.

The specific purpose of chance in preventing us from interfering with the sovereignty of God is illustrated by an analogy from computer science. Some computer programs are designed by the programmer to have randomising operations in order to protect the overall operation of the program. Classical computers are totally deterministic and it is this predictability that gives them their reliability but also makes them vulnerable to viruses. Some programs, for example those designed to sort data into some selected order, can be subverted if a malign hacker provides an input – a virus, that sends the program into a perpetually recurring loop. The program is trapped in this endless loop and thus never accomplishes its purpose. If, however, the clever programmer inserts a randomising operation in the program, at some stage in the endless loop the program suffers a random jump. This jump causes the computer to break out of the loop. Having escaped the trap, it is enabled to start again and continue to complete its intended task. This provides an analogy to help us understand that random processes can indeed have a purpose. Just as the random operations in the program insulate the program from attack by a computer virus, random events in the created order insulate God from any malign influence of beings with free will. God remains in sovereign control of the overall outcome and yet we remain free to act according to our will. As Bartholomew has pointed out, 'We increasingly use chance as a tool in scien-

tific work and it would surely be surprising if God had not got there before us.<sup>35</sup>

This insulation effect applies also to our ability to affect others by our actions. In a perfectly predictable world, determinism would rule. Everything would be rigidly interconnected so that ripples of any event would affect the whole universe! In nature we see random processes dissipate the effects of local disturbances. Sound waves die away with increasing distance travelled owing to the random series of molecular collisions in the air. So it may be that a degree of chaos at some levels is built-in to the system to insulate us from each other. Our individual acts don't deterministically destroy everything like falling dominoes.

If the effects of chance are such as to insulate us from God in order to maintain his sovereignty it might be argued that the corollary must also be true – that chance prevents God from acting in a directed way upon us and the world. This corollary is not however necessarily true. We have already seen that 'intention' is a higher level process that can operate even though random processes are occurring at lower levels. Thus top-down intention can operate in spite of random processes whereas a bottom-up intention can be prevented by those same random processes. Owing to random collisions the motion of an individual atom will not be able to determine the overall behaviour of a gas. A compressor or pump however can move all the individual atoms without being affected by the randomness at the microscopic level. This idea is consistent with Bartholomew's treatment in terms of levels. Statistics offers many examples where random behaviour at one level does not prevent lawful behaviour at higher levels. Indeed, the emergence of certain macroscopic statistical laws depends upon genuine randomness at the microscopic level.

### Understanding God's sovereignty in random processes

We have seen that one possible purpose for God's allowing chance a role in his creation is to protect his sovereignty. We were led to this conclusion by facing the problem of theodicy at its hardest point – the randomness in the distribution of suffering. This thesis complements Bartholomew's proposals that God's use of chance provides him with a creation far richer in possibilities than could be possible in a deterministic universe. In both *God of Chance*<sup>36</sup> and *God, Chance and Purpose*<sup>37</sup> he builds a 'critical orthodoxy' wherein God's sovereignty, that is to say his power to determine outcomes, operates at a higher level such that chance events at lower levels do not prevent his achieving his overall purpose. Whilst supporting the broad thrust of Bartholomew's case I would argue that more needs to be said about God's involvement at the lower levels that affect individual men, women and children. The danger of leaving the case where chance creates greater possibilities for God but where 'suffer-

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35 Bartholomew, D. *op. cit.*, (11).

36 Bartholomew, D. *op. cit.*, (11).

37 Bartholomew, D. *op. cit.*, (12).

ing is unavoidable<sup>38</sup> is that God is removed to some distance and his comfort becomes cold. In this view the illness or accident that befalls an individual is simply collateral damage in a grander process under God's direction. It is then cold comfort to be told that one's pain is an unavoidable side effect in some cosmic plan. I believe however that we can incorporate the present argument for the role of chance in preserving God's sovereignty and our freedom of will and also Bartholomew's general principles with a biblical view of God's providential care of humans and sparrows.

The general question is how God can bring about his purpose in a world where randomness is so pervasive. Chance means that things don't always go to plan. If indeed God has created a universe that is subject to chance, how can he ensure that his will is done? The problem is similar to how our free will can be truly free if God ultimately is in control of everything. The paradox has been recognised for a very long time and it is unlikely that I can provide a complete answer. So, by way of recognising our limitations I will first make some general observations before suggesting a way of reconciling chance and God's providential care at the smallest scale that matters to us.

The first thing to note is that our perception of things may be unduly individualistic. Small particles viewed in a microscope move randomly as they are buffeted by colliding molecules that are too small to see. This random walk, however, takes place in an ensemble of many particles such that the overall behaviour is entirely predictable. Our individual experience is not the whole story. Each person is part of an ensemble connected by relationships such that a random accident suffered by one individual is shared to some extent by many. It is conceivable that God's purposes are not solely defined by a simple sum of individual experiences. There is enough in human experience and the insights of biblical perspectives on history to suggest that God's plan for humanity involves direction on a grander scale. This need not be inconsistent, however, with God's intimate attention to detail on the scale of individuals and their personal circumstances.

The second thing is that what is perceived as random may be so only because we are unable to discern the underlying correlation. For example, there may be no correlation in the make or model of cars on the road sampled during the day. The number of children in each car, however, may be correlated with location of schools or time of day. Furthermore, although deterministic chaos and non-deterministic chaos may appear indistinguishable to us, the underlying causes are very different. What is also true is that some seemingly chaotic events result from complex processes that are non-computable by us may not be incalculable to an almighty God.

Thirdly, our experience of paradoxes in Physics teaches us that usually the problem lies with an inadequate model of reality. Our models usually function

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38 Bartholomew, D. *op. cit.*, (12).

as analogies and analogies have limitations simply because they are like the reality only in certain respects. Paradoxes are resolved when the limitations of our models are recognised – the reality is different from our mental picture. So the apparent inconsistency of God's justice and the seemingly unjustified suffering of the innocent may also be based on an incomplete understanding of what it means to be a person in God's creation process.

Fourthly, we have identified an important feature of the problem in relation to the predictability of outcomes. Prediction from the present to the future clearly involves the concept of time. Our rationality has evolved in a one-dimensional time. We see everything in terms of sequences in time. Some of the paradox is conceivably a consequence of this limited perspective. If, however, God is not in time in quite the same way as we are – since time itself is a property of the created order – then he may not be limited in his actions to the time sequences that we experience. The concept of space-time in relativity theory is difficult enough let alone the extra dimensions that are integral to some current theories of particle physics! To mention the theories of parallel universes is not to claim understanding but to recognise that we can be open to logical possibilities. In the spirit of St Augustine we should not be surprised if there are things relating to God that are beyond our capacity to understand.

To raise these issues is not simply to resort to mystery as a defence. Neither is it an attempt to avoid the question by appealing to the limitations of our knowledge. It is rather to recognise that some of the problems are of our own making in the sense of being a result of how we think about things. It certainly remains open to possibility that God can operate, in a sovereign way, in a world where random and even radically uncaused events occur.

With the provisos declared I now turn to the problem of how God can allow chance a role, maintain sufficient sovereign control to achieve his overall purpose and yet pay detailed attention to the affairs of individuals. In particular I want to link what we have learned from the study of randomness in nature to a biblical perspective on individual suffering under the providence of God. The paradox implied by the acceptance of chance as real within a world deterministically controlled by God could be approached in a similar way to that in which compatibilism treats free will – namely, that whatever humans choose to do is predetermined but they are still free to choose. That is not the approach I take here – that whatever happens by chance does so because it has been pre-determined to do so. This seems to me to be a contradiction in terms. The parallel with free will, however gives us a way into a possible way of understanding how God gives chance a genuinely free reign but is able, nonetheless to stay in overall control.

In the context of human free will William James proposed a helpful analogy.<sup>39</sup> We operate as amateur chess players pitted against a Grand Master. We

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39 Polkinghorne, J. in private communication; Paulsen, D.W. 'The God of Abraham, Isaac, and (William) James', *The Journal of Speculative Philosophy* (1999) 13(2) (New Series), 114-140.

have freedom of choice and will, subject to the rules of the game. No matter what moves we choose, however, the outcome of the game is never really in doubt. The Grand Master always wins! I suggest that this analogy may be extended to include the occurrence of random 'moves' in nature. The 'Grand Master' is always able to take these into account and to ensure his desired outcome. In the terms of Bartholomew's proposition, God achieves his desired outcome irrespective of the chance processes taking place at a lower level. At some levels the random events have no consequence and do not require intervention. At other levels a stronger 'forcing' may be necessary to ensure God's desired outcome. An infinite, omniscient and omnipotent God would be capable of doing the necessary calculations to predict what, if anything, is required from his perspective on our space-time universe. On the other hand God could just as easily be envisaged as making on-the-fly adjustments as he maintains everything in existence. Grand Masters are well known to be capable of playing many chess games simultaneously. Similarly God's sovereign control of the world involves not only winning each game overall but also paying attention to each move that is made.

When I taught my children to ride a bicycle I did so by first holding the saddle from behind. Thus, running alongside, I could keep the bicycle stable and the child safe. The bumps and wobbles that occurred were corrected at first by my stabilising grip. Then I gradually weakened my hold until the bicycle was free. My child was then 'in control' and learned to cope with the random bumps by making their own balancing adjustments. All the while however I kept my hand only an inch or two below the saddle in case they needed help. It was an important part of the learning process that he or she experienced real bumps, genuine chance events, and learned how to cope with them. It may be that this is the way in which God's sovereignty needs to be understood. He is alongside us in all the random ups and downs of life and no matter what happens, even by chance, he is holding us in his providential care, 'because he is at my right hand, I shall not be shaken.'<sup>40</sup>

Seeing life, with its random ups and downs, as a process of becoming is consonant with the positive ideas of Process Theology. It seems to me acceptable, within an orthodox Christian view of creation, to see life's experience as such a process. Creation is not a *fait accompli*! Whatever way we see God as sustaining the process, either by subtle or more forceful interventions there is still a role for human contribution. The author of Genesis certainly seemed to see mankind as being involved in the creation process. The account in the second chapter of Genesis notes that initially 'no plant of the field had yet sprung up' for 'there was no man to work the ground'.<sup>41</sup> The tendency of nature to bring forth randomly distributed 'thorns and thistles' in the 'garden' could be seen as

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40 Ps. 16:8 RSV.

41 Gen. 2:5; see also 2:15 & 4:2.

part of the process with which mankind has to deal. Our response to these random effects is part of the process of our 'becoming' and a test of our willingness to cooperate with God in relationship with him.

### Conclusion

The conclusion we come to is this. There is a purpose to chance itself. At the creative level random events provide a robust method to explore the range of possibilities allowed by physical laws. This interaction of chance and necessity is the mechanism of evolution. On the moral level the inability to predict outcomes creates a freedom to act that establishes real moral responsibility. At the theological level chance prevents us from forcing God's hand and preserves his sovereignty. The materialist claim that any randomness in the world proves there is no purpose to our existence is seen to be a fallacy. This fallacy is based on a short sighted perspective. It supposes that 'purpose' can only be defined in terms of the outcome of the process. In this view, since the outcome of a random process is unpredictable then, by definition, it cannot have a purpose. The alternative theological perspective shows, however, that a process may be intentionally random. Overall outcomes can be purposive even in presence of chance. The purpose of the randomness is to preserve free will, moral responsibility and also to leave God free to act – to maintain his sovereignty.

We have already noted that intentionality emerges only at a level of complexity where consciousness is possible. The possibility that randomness on the physical level could have a purpose on a different or higher level, may be illustrated by a further analogy. Our sense of beauty and appreciation of it involves a balance between order and chaos. Cloudscapes, sunsets or the flickering patterns of flames are profoundly restful to our spirit. A walk in the woods is enhanced by the chaotic arrangements of mosses and lichens that adorn rocks and trees. The beauty of a dry stone wall seems based on just the right amount of chaos in the shapes of the stones. A wall composed of uniform Lego-like bricks would somehow not be so appealing to our senses. In this context it is the randomness itself that is necessary for creating the beauty that we see and to which we respond. The ability to appreciate beauty is clearly an emergent property of consciousness which is itself an emergent property. Thus to limit randomness to being solely a property of mindless and purposeless physical processes is to miss the possibility that a purpose may be discerned when viewed at a different level of experience. The richness arising from chance is an ingredient in the creation of beauty.

Our conclusion then is that chance is a necessary aspect of our existence. The necessity of chance is seen to be not just an accidental outcome of the laws of nature but an intentional aspect of God's creating process that preserves both our freedom and his freedom to act. We have seen also that randomness, far from denying purpose, actually itself serves a purpose. God is free to act in overall sovereignty to direct the process of our becoming. How we respond to

the ups and downs of life is part of the process of defining our character. The Christian perspective, shared to some degree by all the major religions, is that beauty of character is what interests God. Seeing life as a process of becoming – made in the image and growing into the likeness of God leaves open the possibility that God can equalise in some way the apparent injustices of suffering. Jesus was once asked why a certain man was born blind.<sup>42</sup> A commonly held view at the time was that such suffering was a consequence of sin committed either by his parents or, bizarrely, by the man himself whilst in his mother's womb! In other words, it wasn't a random accident. Jesus said 'Not so!' Such situations are, Jesus declares, not a consequence of any man's deeds but an opportunity to experience the work of God in our lives. In the context of John's Gospel, we are perhaps meant to take this encounter as a metaphor for God's offer to heal 'Everyman's' spiritual blindness. When we learn to see things from a different perspective we begin to realise that all the random ups and downs of life are there for a purpose. In such a life we are free to respond to God's grace or to reject it.

The incarnation and Jesus' compassion for the lowliest in society as well as for the sick speaks to us of God's plan for humanity and also of his concern for each individual and their circumstances. We need therefore to refine our notion of sovereignty to retain this sense of God's providential care whilst allowing for genuine chance in the circumstances of life. There is much scope for theologians to work on how this may be achieved. I suggest that there is an openness in Scripture to allow us to explore this further. When Calvin alluded to God's watching over sparrows he was of course referring to Christ's words in Matthew 10:29, 'Are not two sparrows sold for a penny? And not one of them will fall to the ground without your Father...' Various translations then insert either 'wills' or 'knows' but neither word is in the Greek. The choice of word here involves some interpretation and will depend to some degree on how God's sovereignty is understood. The context is one of enduring persecution and hardship as a result of faith in Christ and we are not promised immunity from the ravages of evil. There is much else in Scripture that speaks of the refining of character through suffering, a suffering that has been shared by God himself. Christ's assurance to his followers is that he who watches over sparrows will ensure that, whatever happens – even we may say 'by chance' – their souls can come to no *eternal* harm. The safety we have in God's providence is one where his sovereign hand steadies us and underpins our efforts to cope with the random bumps that come by chance as much as by human persecution. This is well expressed by Rupert Brooke who faced the terrors of random destruction in the First World War:

Safe shall be my going  
Secretly armed against all death's endeavour

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<sup>42</sup> John 9: 1-6.

Safe though all safety's lost; safe where men fall;  
And if these poor limbs die, safest of all.<sup>43</sup>

So our refined understanding of God's sovereignty is one that differs from the total determinism of a naive orthodoxy but is not exactly the 'critical orthodoxy' of Bartholomew, nor even one where God is immanent in the general sense avowed by Peacocke but one where he is intimately and actively involved in our spiritual development in and through the chance events of life.

Finally we note that the *experience* of God's providential grace comes by faith. Faith is not an escape route from difficult problems, still less a substitute for understanding. It is a rational choice to trust in God in an uncertain world. If there were no chance, and all was pre-determined, faith would be meaningless. Faith is the exercise of free will in a world where things may seem unjust. It is a choice based on evidence of God's providence not only on the level of history but also in personal experience. Seeing things in this way may help us find peace during the storms of life that come out of the blue. Realising that there can be a purpose in all things we may come to accept chance as a gift from God and find that 'in acceptance lieth peace'.<sup>44</sup>

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**Paul Ewart is Professor of Physics in the University of Oxford, UK**

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43 Brooke, R. 'Safety' in *Collected Poems*, John Lane (1916).

44 Amy Carmichael, *Toward Jerusalem*, Dohnavur Books (1936).