



What exactly is randomness? We could begin by looking to a standard definition, such as “having no specific pattern, purpose or objective.” Further, we could imagine some example of randomness, like a coin flip, a die roll, or a roulette wheel spin. If we ponder it still further, randomness might seem to suggest, not simply unpredictability, but chaos and unintelligibility. How can we reconcile the apparent lack of intelligibility and order in the random and chance events of history, both in the evolutionary history of life and in the history of human civilization, with a divine providence that knows and orders all things?

In order to answer this question we need to understand what exactly makes random events unpredictable. We need look no further than a surprise birthday party to see that what is unpredictable

for one person need not be so for a whole host of other people. Generally, randomness can arise from two, or more, perfectly natural processes each working towards some natural end, that end up interacting in a way that interrupts them both. For instance, it is natural for a wolf to chase its prey and natural for a rock loosened from a cliff to fall. However, it would be a random or chance event if this particular wolf happened to be struck down and killed by this rock, mid-chase.

Even our ideal cases of games of chance are only random because the unknown initial conditions make them difficult to predict. There is nothing particularly mysterious about the physical processes involved in the roll of a die. If the initial conditions were well controlled or carefully examined the randomness could be lessened or even eliminated. Gamblers have beaten the odds in roulette using computers to work out the physics of each spin, and engineers have made a mechanical coin flipper that uses the same initial conditions to always come up heads.¹ Newtonian physics attempts to extend this simple anal-

ysis to all of nature. The argument made by some physicists was that if we could know the exact conditions of every part of the universe at any one moment, we could use the laws of nature to calculate the exact conditions of every part at any future moment.² While this task is impossible, the principle is that the world is ultimately deterministic where any randomness we encounter is only apparent, arising from a lack of full knowledge on our part.

Randomness, Chance, and the Providence of God

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Since the advent of quantum mechanics this deterministic view of physics has fallen on hard times. On account of many unexpected results, quantum mechanics gave rise to the Heisenberg uncertainty principle, which put a hard limit on just how exact our exact picture of any object could be. This was not simply a statement of some technical difficulty in measuring the properties of an object, but a fundamental limit on how precisely different properties of an object, for instance its position and its speed, could be known. This placement of chance at the core of all phenomena bothered many physicists, including Albert Einstein, who summed up his dissatisfaction in his oft-quoted phrase, “God does not throw dice.”³ While the success of quantum mechanics has led most physicists to accept the loss of the tidy picture of classical determinism, there are still deep disagreements about the nature of the apparent randomness in quantum mechanics, including attempts to revive determinism.

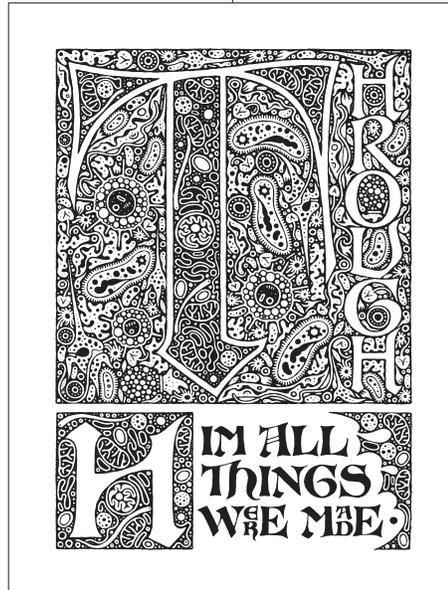
It is tempting to think that divine providence requires something like determinism. It is easier to

see how divine providence would work if everything that happens follows a fixed set of mathematical laws. In this case, God could simply be a good physicist who knows perfectly both the state of the universe and the laws of nature. In this view, God is infinitely more knowledgeable than any human physicist, but His providence would basically be a matter of good physics. This linking of providence to determinism is problematic for free will but also seems to be invalidated by quantum physics. Even if we can make certain accurate predictions from the probabilistic quantum mechanics it would still not allow us to explain how God's providence pervades every detail of His creation so that it is always ordered towards the good.

The solution, of course, is that we cannot bind God's divine knowledge and power to the limitations of created knowledge and power. This is not a physical claim about any particular phenomenon, nor a simple appeal to mystery. It is a philosophical claim about the way that God creates and sustains the universe. God's providence is not a mathematical calculation, but an omniscient and omnipotent mastery of reality that brought the universe into existence out of nothing and sustains it in existence at every moment of time. St. Thomas is clear that "whatsoever divine providence ordains to happen infallibly and of necessity happens infallibly and of necessity; and that happens from contingency, which the plan of divine providence conceives to happen from contingency."⁴ The fact that a particular phenomenon has an element of randomness or contingency does not remove it from divine providence. God's creative power is such that the very powers that allow a creature to act and to cause, even to cause contingently and by chance, depend at every moment on His sustaining power. Whatever happens in the world, whether a radioactive decay, a biological mutation, a decision to sin, or a decision to praise Him, does not catch God by surprise. In fact, He gives His creatures

their existence and their natures that allow them to decay, to mutate, to sin, or to praise. This type of knowledge seems to go against our very understanding of what knowledge and causation

are, but that is because we are only familiar with how created causes know and work. God is not another part of nature. He is not even the greatest part of nature. Rather He is nature's author and sustainer. He is the Creator, totally other to the created universe. **TOBE**



¹ Stories about the roulette computers (<https://www.newscientist.com/article/mg21428644.500-roulette-beater-spills-physics-behind-victory>) and mechanical coin flipper (<http://www.npr.org/templates/story/story.php?storyId=1697475>)

² Pierre-Simon Laplace famous stated this idea as: "We ought to regard the present state of the universe as the effect of its antecedent state and as the cause of the state that is to follow. An intelligence knowing all the forces acting in nature at a given instant, as well as the momentary positions of all things in the universe, would be able to comprehend in one single formula the motions of the largest bodies as well as the lightest atoms in the world, provided that its intellect were sufficiently powerful to subject all data to analysis; to it nothing would be uncertain, the future as well as the past would be present to its eyes. The perfection that the human mind has been able to give to astronomy affords but a feeble outline of such an intelligence." *Essai Philosophique sur les Probabilités* forming the introduction to his *Théorie Analytique des Probabilités*, Paris: V Courcier; repr. F.W. Truscott and F.L. Emory (trans.), *A Philosophical Essay on Probabilities*, New York: Dover, 1951 .

³ Einstein used variations of this quote numerous times. An early example is from *Letter to Max Born* (4 December 1926); *The Born-Einstein Letters* (translated by Irene Born) (Walker and Company, New York, 1971)

⁴ *Summa theologiae*, I.22.4 ad 1.

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