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Reviews

God of Chance. By D. J. Bartholomew. London: SCM Press, 1984. Distributed in U.S. by Fortress Press, Philadelphia. 181 pages. $10.95.

A decade or two back this title might have been *God or Chance*. The one-letter change indicates considerable reunderstanding both scientifically and theologically. Earlier, it seemed that we had to choose God or chance; D. J. Bartholomew joins both in the "splendid vision of God who conceived a world built on chance and from which he continues to fashion something of eternal value" (p. 143). A disjunction has become a conjunction. The universe is "designed in such a way that chance had a role to play" (p. 30). "Chance was God's idea and . . . he uses it to ensure the variety, resilience and freedom necessary to achieve his purposes" (p. 14).

William P. Alston, analyzing God's action in the world, concludes, "I am not convinced at this point that it makes sense to think of God's leaving certain details of the basic structure of the universe 'to chance'" ("God's Action in the World," in *Evolution and Creation*, ed. Ernan McMullin. University of Notre Dame Press, 1985, p. 219). Against Alston, showing how fundamental a shift in argument underlies the one-letter change, we can put Bartholomew's "central thesis that a world of chance is not merely consistent with a theistic view of nature but, almost, required by it" (p. 102). "Chance offers the potential Creator many advantages which it is difficult to envisage being obtained in any other way" (p. 97).

Bartholomew's argument merits careful attention because it is the only book length analysis by a professional statistician who is theologically articulate, as well as broadly informed in the natural and social sciences. He writes clearly, compactly, bravely, modestly—not shirking hard questions and freely admitting to tentative answers. He argues a seminal case at the same time that he asks questions in the earshot of those whom he hopes can answer them.

Statistical understandings of the world, whether in physics, biology, or the human sciences, have increasingly shown that chance is consistent with order. There is a "subtle and surprising complementarity of chance and determinism" (p. 66). Physics, as a paradigm science, was for centuries mechanistic and deterministic; that seemed to give perfect order but with too little room for human freedom. Biology over the last hundred years has posited randomness both at genetic and evolutionary levels; that seemed to prohibit divine design. Both sciences have now become statistical. These same statistical patterns also characterize the human sciences—the lengths of time, for instance, that computer programmers stay on their jobs. The data come everywhere with scatter and yet with patterns that fit regression lines and standard curves.

Some interpret these statistics as always and only a remedy for human ignorance. All actual events are determined in every particular but our human access is partial and veiled. To ascribe an event to chance is to report that one has failed so far to find the causes, and in ignorance of particulars we can still

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generalize statistically. Einstein refused to believe that God plays dice with the world, and for many scientists determinism has been an article of faith, requisite for order and justified by the repeated causal chains that science has successfully traced. But others are not so sure. No doubt much of the scatter is due to unknown causes, but is all of it? Perhaps statistics reveals the way the world objectively is; statistical analysis is not a mask for ignorance but realistic description.

The lines between determinism and chance are not as clear as they once were. Some deterministic processes (the output of a random number generator in a computer, or mathematically chaotic systems) can be indiscernible from genuinely random ones. Random processes in particular events (a coin flipped) can quickly lead to high probabilities in the aggregate (fifty percent heads, fifty percent tails). Random processes at one level (scattered tiny droplets of paint) can assure regularity on another level (an evenly painted wall). Random sampling can assure reliable scientific results. Some ends can be certain while paths to that end are uncertain. We know with virtual certainty that Sam will die, although we do not know his path through the world prior to his death. We do not know when Sam will die, though we can predict death rates in Los Angeles. Chaos is regularly mixed with order.

Bartholomew invites us to reform our theology, consistently with statistics. The subtle mixture of order and chance that science finds can enrich the doctrine of God. Formerly, chance seemed unworthy of God's omniscience and omnipotence; it was regarded as irrational and unloving. How would God intelligently care for a world God leaves to chance? If the world is by chance, it is not godly. If godly, it is not by chance. Bartholomew demurs: "The mere existence of chance processes in nature is not a sufficient ground for inferring the absence of purpose." To the contrary, "only in a world with a sufficient degree of randomness is there enough flexibility to combine a broadly determined line of development with adequate room for the exercise of real freedom on the part of individuals" (p. 82). Chance does not contradict divine providence; rather, it illuminates it.

Sometimes Bartholomew even suggests that a pure chaos is impossible; any chaos will emit spurts of order. "Chaos and order are complementary; the presence of one seems to imply the other. . . . Whatever the nature of the most elemental happenings there will be, inevitably, a hierarchy of order and chaos in the resulting cosmos" (p. 95). If so, Bartholomew is not clear whether this coupling of chaos and order results from God's action or is empirically or logically anterior even to God. If the latter, the statistical character of the universe might be a more ultimate given than God.

Bartholomew, a statistician, finds God the Statistician, with divine "purpose primarily expressed in the aggregate effects of large numbers of genuinely random events" (pp. 135, 138). God the Averager operates in the probable trends, letting the individuals rattle around in the statistics. "We therefore had to formulate a doctrine of providence which, while allowing that God is ultimately responsible for everything that happens, did not require his intimate involvement in all things" (p. 145). God does not notice the individual sparrow fall; God watches *Dendroica* populations!

Perhaps it will be more difficult to separate preordained probabilities and accidental contingencies than Bartholomew realizes. Social life among insects is confined to the order Hymenoptera with high probability. Is that a preset divine outcome? Or an accidental byproduct of some genetic setup (haplodiploidy)? Australia and New Guinea are inhabited by marsupial mammals; that,

presumably, is an accident of isolation by plate tectonics. On other continents, placental mammals have over evolutionary time outcompeted marsupials; that trend is God's will? Marsupials in isolation often evolve along lines parallel to placentals; that too is God's will? The resilience of mammals and their capacity to radiate is not an accident but a genius in the complex, neural, mammalian way of life. In any case, God's providence is systemic, not particular. God's design shows up in regression curves.

Bartholomew must be right that there is nothing ungodly, irrational, or disorderly about statistics. The originality of his book lies in its thorough examination of the way in which stochastic processes are foundational in the world and consistent with divine design. Bartholomew is also right that this at once permits God to ordain bigscale ends and to give human individuals freedom within the overarching trends. Providence is, to this extent, a statistical truth, true on average, though interrupted by human freedom. Bartholomew even suggests that the statistical character of the universe is primarily for the benefit of humans. "Our main theological contention will be that a degree of indeterminacy in nature is essential if human choices are not to be illusory" (p. 4).

A minor error: Karl Popper is said to be a determinist, agreeing with Einstein that "if only we were omniscient we would be able to trace the causal links backwards and find a satisfying explanation in deterministic terms. In principle, then, chance would have been banished from the universe" (Bartholomew, p. 67). Popper can be confusing, but Popper is really an indeterminist: "I am an indeterminist. . . . Einstein was mistaken in trying to hold fast to determinism" (*Objective Knowledge*, Oxford: Clarendon Press, 1972, p. 215).

A minor curiosity: Bartholomew is inconclusive whether he is determinist or indeterminist—at least outside human affairs. Chance and determinism are so subtly related that God can get all the needed chaos either deterministically or indeterministically; we cannot know which way, and it does not matter. "Our conclusion . . . was that we could never ultimately know whether what we observe is a pseudo-random process generated by deterministic means or whether there was no causal mechanism whatever. From a theological point of view there is little at stake as long as it is allowed that God's is the ultimate responsibility for chance being there. Its *effect* is the same whatever the mode of its generation." If pressed, he inclines to believe that "God generates the requisite degree of randomness . . . by deterministic means" (p. 102).

Continuing Bartholomew's main inquiry, I suggest several directions for the next stage of the debate Bartholomew has so seminally launched.

First: Is all that theists want to say about God's providence in human affairs a matter of objective probabilities? Does the statistical God also work personally, surprisingly, with novelty in the lives of individuals? In a revealing analogy, Bartholomew compares individual persons to solo pilots launched into this world where God operates through the averages. We are on our own in a world that is systemically dependable, though locally capricious, free in a challenging world. We can radio to headquarters for advice, but there is no providence that alters the weather or corrects mechanical faults (p. 139).

Does God tamper with the detail? As suggested by the solo pilot analogy, Bartholomew thinks objectively not, subjectively sometimes yes. Most of us are left to run these divinely ordained world probabilities, wending our way through our fortunes and misfortunes with radio advice from headquarters. God enters human minds on individual occasions, but God does not adjust the preset world probabilities.

Only the rare person, on whose behavior world fortunes turn, really gets special providence, and even this is subjective providence, not objective providence. Beyond the general, statistical pressures through which God keeps working toward creativity, morality in decisions, and peace-making, God can act "at the roots of human decision-making as individuals exercise their inherent capacity for freedom of action. If God is able to exercise influence at this level, he thereby influences the course of events in the world" (p. 141). "The normal mode of his action is in the realm of mind" (p. 143). This "top-down" and subjective approach Bartholomew prefers to the "bottom-up" and objective approach of W. G. Pollard, who tries to detect God bubbling up through submicroscopic indeterminacies (p. 141). "In particularly difficult circumstances" God might provide some "almost irresistible" communication that prevented, for example, "the pressing of the nuclear button" (p. 141, p. 139). Bartholomew's statistical God is thus the existentialist's personal God, who works inwardly but is otherwise absent from the world particulars.

Is statistics plus inner guidance enough to spin the world history? Statistics is a quantified science; probabilities come with numbers. But narratives do not number well; stories have few bell curves in them. For a good story God the Narrator (beyond God the Statistician) may need critical control at turning points. It is not merely statistical averages that make history; it is critical surprises, anomalous turns, new beginnings. Narratives do not fit regression curves; regression curves (as every statistician knows) cannot be extrapolated very far through history. With the resources that Bartholomew provides, God can convert statistical curves into narratives only by inward persuasion in responsive human lives. Although Bartholomew sometimes notices how large historical outcomes can turn on thresholds at initiating events, he resists incorporating this into this doctrine of providence, because he dislikes finding God in the improbabilities.

No doubt God underlies the probabilities, but we may also suspect that God sometimes underlies the critical surprises. Take, for example, the story of Jesus. Bartholomew thinks that Jesus was at the risk of the chances, if he was human like the rest of us, and that means Mary might have suffered a miscarriage, or Jesus might have died an accidental death in the carpenter's shop. "Jesus was no less subject to the chances and changes of the world than we are" (p. 152). Bartholomew entertains the idea that God sent various messiahs, or tried various incarnations, with the hope that sooner or later one of them would succeed, and that was Jesus Christ (p. 153).

Perhaps. A perfectly plain reading of the Bible story is that God took risks in creation and in redemption. Not only could things go wrong, but they did go wrong, and the Biblical history is the result. Beyond this, however, Christians may sometimes want to detect God's hand objectively in the particulars, in the contingencies, as well as in the averages and probabilities. Especially at the Cross, and often at the crucial moments it foreshadows and illuminates, we can wonder whether Bartholomew's "view of the universe as a giant stochastic process" (p. 157) is adequate to its narrative, storied history.

Second: Bartholomew believes that statistical design can illuminate the divine providence over evolutionary history. A continuing creativity has been loaded into matter, and the evolution of life, mind, and persons was inevitable, despite the random vicissitudes of natural history. Bigscale divine design is superposed on randomness at genetic and local levels. "I have argued that in spite of the indeterminacy of the evolutionary path, the end-product is very likely to be some form of intelligent life capable of reflecting on its own nature

and influencing its own destiny. If this is so, we may infer that human life was what God intended and man remains his masterpiece" (p. 149).

A problem Bartholomew has yet to face is that nothing in the theory of natural selection loads the dice. To the contrary, hardnosed interpreters of the theory insist that both the arrival and the subsequent "progress" of life on Earth is random—in the celebrated conclusion of Jacques Monod: "the product of an enormous lottery presided over by natural selection, blindly picking the rare winners from among numbers drawn at utter random" (Jacques Monod, *Chance and Necessity*. New York: Random House, 1972, p. 138; discussed in Bartholomew, pp. 17-36). John Maynard Smith, a principal theorist, insists, "There is nothing in neo-Darwinism which enables us to predict a long-term increase in complexity" (*On Evolution*. Edinburgh: University Press, 1972, p. 89). Stephen Jay Gould, another theorist, concludes, "Natural selection is a theory of *local* adaptation to changing environments. It proposes no perfecting principles, no guarantee of general improvement." It provides no reason to believe in "innate progress in nature"; none of the local adaptations is "progressive in any cosmic sense" (*Ever Since Darwin*. New York: W. W. Norton and Co., 1977, p. 45).

Certainly there are biologists who hold otherwise, but mainstream biological theory in its present form is not prepared to give Bartholomew the statistical trends he needs for his averaged divine providence. On the scientific side, Bartholomew must persuade biologists that there are trends in the data scatter across the millennia of Earth's natural history that their theories are not catching. Only with such a revised evolutionary theory will it be possible to reconcile theology and biology via statistics.

Even if we could find naturalistic tendencies that load the dice, natural history (the rise of life, of dinosaurs, of mammals, of persons) might still look suspicious. There is nothing in the chemicals *per se* that makes highly probable this outcome (these same chemicals exist all over the universe regularly without such outcome), although these chemicals do always and everywhere have the possibility of life in them. We are not surprised when sodium (Na) and chlorine (Cl) form salt (NaCl); these atoms are "loaded" to do that, but when sodium enters into the formation of neural cells, it does so keyed by historical discoveries, by information that is nowhere present in the mere atoms themselves, although it can be coded into a string of them (known as DNA).

Nor is there any such probability in bigger systems as such. The loading for the origin of life, if there is any, has to be not simply at the generic systemic level, since these atoms exist in astronomical systems throughout the universe, but it has to be particular to the Earth system, perhaps a lucky system loaded to become a living ecosystem, with many (hopefully not all) other planetary systems elsewhere stillborn. Stochastic systems are independent of history in the sense that probabilities today do not depend on adventures long past. But historical achievements do get cumulatively, cybernetically, superposed on Earth's stochastic processes. The secret of life may lie in the former as much as the latter.

On the theological side, if God is in the averages, built into the probabilities and absent from the detail (although present for guidance in the minds of persons), what do we say of God's action during the twenty billion years before the arrival of humans? The nonhuman fauna and flora are left to divinely preset averages. "The great stochastic process of nature and history was heading for a pre-determined end without his needing to bother" (p. 165). This is true even yet in most of the Universe and in areas of Earth where things

proceed unaffected by human decisions. This can seem a welcome autonomy. But also we have a do-nothing God for twenty billion years and across most of the twenty billion light years of space.

Bartholomew concedes that God might tamper with the particulars. "I see no reason to deny the possibility that, at least on rare occasions, God may take decisive action to direct the course of nature or history" (p. 143). But this is an anomaly in his general theory. Bartholomew likes to find God in the probabilities, not the improbabilities. On the whole, God is now absent from the world particulars; these by design are left to chance.

Is all that most theists want to say about the divine creativity in natural history a matter of stochastic process? A difference between probabilistic systems and historical ones, again, is that big outcomes can turn on little events. Even supposing certain prolife trends, I doubt whether one can always produce the more out of the less that has characterized evolutionary history simply by letting the system run through its preset probabilities. Bartholomew notices that some systems are especially sensitive to narrow thresholds at initiation points (whether a fire starts when a spark falls in a forest). Where systems "depend critically on the random behavior in the early stages of the process" (p. 78), significant differences in outcome do hinge on genuine chance. Bigscale results do not average out regardless of initiating particulars. Perhaps we need to suppose some "point inspiration" at critical junctures, mutation points. Historical emergence may be something more than stochastic process.

Third: Bartholomew dislikes what he calls the "*significance test* approach to theism" (p. 37). Assuming either God or chance, a frequent line of argument finds that the chances that world order should be as it is are so outrageously slim that divine design is the only reasonable conclusion. With Bartholomew's God of chance, we expect to find natural tendencies loading the dice. The probabilities are not negligible; to the contrary, they are high. Some preference sieve over the randomness catches the upstrokes. Although Bartholomew thinks that statistical tests for God once the universe is operating (for example, at the origin of life) are ill-advised, he admits that at the initial set-up of the universe (the big bang) the evidence is impressive (evidence often discussed in terms of the anthropic principle) and the capacity to assign probabilities fails. "Something is going on" (p. 63). Just what this something is needs an analysis that Bartholomew is unable to give, and it may be that here at the foundation of the world, with its interplay of contingency and necessity, we will find God as much in the improbabilities as in the probabilities. Bartholomew may press for a conjunction (God and statistically averaged chance) that, taken by itself, misses the truth as much as did the classical disjunction, God or chance.

Fourth: When we find natural and social processes that convert possibilities into expectable probabilities, that take the chances out of the bigscale trends, Bartholomew thinks we detect providence. What will he say to those who think that with the discovery of secular probabilities, natural or social, there is no need for further explanation? I share with him the conviction that it does not constitute a finished explanation of a thing to discover that it is natural. Nor that it is social. Nor that it is probable. One can still puzzle why nature, society, and probabilities are this way. But a large part of this conviction lies in how the natural series regularly breaks records of previous attainment and power. A large part lies in how social processes take on particular historical form and yield narratives of judgment and redemption. Statistical trends are impressive, and, in their own way, godly. They may be necessary. Perhaps too they are less than sufficient as evidence for divine providence.

In sum, this is one of the more challenging books to appear in recent years. If it receives the critical discussion it deserves, the relations between science and theology will be enriched for a long time to come.

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