CHANCE IN A CREATED WORLD: HOW TO AVOID COMMON MISUNDERSTANDINGS ABOUT DIVINE ACTION[1]

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Abstract. In the article 'Against Physicalism-plus-God: How Creation Accounts for Divine Action in the World' (Jaeger 2012a), I defined a framework which allows us to make some progress in our understanding of how God acts in the world. In the present article, I apply this framework to the specific question of chance events. I show that chance does not provide an explanation for special divine action. Nevertheless, chance does not hamper God's ability to act in the world, and creation provides a framework for the understanding of chance, which is akin to what we see in modern science.

DEFINITIONS: WHAT IS CHANCE?

Chance is a notoriously difficult concept. Different authors use it with different meanings, and the same author can use several meanings in different contexts, sometimes without any explanation (and perhaps sometimes without being aware of the shift of meaning). Thus it is crucial to provide a precise definition, in order to avoid unnecessary confusions.

I offer the following basic definition: *A chance event (fact, state of affairs, etc.) is an event (fact, state of affairs, etc.) without cause*. Please note right from the start that chance as the absence of a cause can never be used as an *explanation* of anything. The affirmation that something happens 'by chance' does not mean that 'chance' produced it, but that it happened without a cause, which is the very opposite of a (causal) explanation.

[1] For a fuller treatment of chance, see Jaeger (2014).

The basic definition gives rise to a variety of distinctions, as 'without cause' can have different meanings. The most important ones for our reflection are the following:

– *Inexistence or ignorance of cause?* In the age of classical science, it was believed that every event has a cause. For Leibniz, the principle of causality was logically necessary, it was as certain as 3 x 3 = 9.[2] Following Hume's criticism of (efficient) causality, Kant reinstates causality as a category of the faculty of understanding. It is the result of a synthetic *a priori* judgement: although it is not logically necessary, it is nevertheless true *a priori*, that is before any experience (Kant 1781: III, 92s/IV, 65s). In fact, no experience (in the scientific sense) is possible without presupposing the universal reign of causality. If we do not take for granted that all that happens is the effect of a cause, our senses would register impressions, but it would be impossible to integrate these into a system, which could count as scientific experience (Kant 1781: III, 167).

In such a perspective, chance can only stem from the limits of our knowledge. But quantum mechanics has undermined confidence in the universal reign of causality. Although discussions go on, the prominent interpretation today considers that there is 'real' chance in the atomic and subatomic world. It is still possible to formulate a more limited law of causality following the lines of Kantian transcendental reasoning, in close connection with incomplete objectivation prevalent in quantum mechanics.

– *Chance à la Cournot (the encounter of two independent causal chains) or indeterminism*? There is place for (a certain form of) chance in a completely deterministic universe: Antoine Augustin Cournot, following Aristotle and J. S. Mill, defined a chance event as the encounter of two independent causal chains. As an illustration, let us remember the strange happenings on February 15, 2013. Astrophysicists had calculated that an asteroid would pass the earth at a short distance. The same day and without having been predicted, another smaller asteroid penetrated the atmosphere over Tcheliabinsk, at the border of Siberia and caused considerable damage. The orbits of both asteroids were determined by the law of

[2] Mittelstaedt (1989: 149), who quotes G. W. Leibniz, *Von dem Verhängnisse*, *Hauptschriften II*, p. 129. See Mittelstaedt (1989: chap. V) concerning the principle of causality in classical and quantum physics.

gravity, thus were not without cause. Nevertheless it makes sense to ask if the fact that both events took place the same day was due to chance, that is without correlation. In fact, scientists have not come to an agreement on this question: whereas several studies did not point to any link between the two asteroids, an article published in *Nature* tried to show that both had been part of a bigger asteroid which broke up (Borovička et al. 2013).[3]

– *Without an efficient cause (which produces the event) or without a final cause (aim, purpose)?* Another distinction is inspired by the Aristotelian theory of causality, his famous four causes. Taking up two of them, the efficient or moving cause is what produces the event (the movement, the change), it is this cause which we normally have in mind when we talk about causality today. The final cause refers to the aim, the purpose for which something is produced. The final cause points to the project, the design behind the events. Modern physics has largely discarded final causality. But the concept is still relevant in biology and even more in the human sciences. The easiest way to grasp the distinction is to think of an artefact: efficient causality is interested in the chain of physico-chemical causes which have led to the production of a pair of glasses, for example. Final causality underlines the fact that it is also true that the glasses were produced in order to allow a short- or longsighted person to see better. Concerning chance, it can be asked if, under certain conditions, an end can be pursued in the absence of efficient causality: is it possible to realise a project with the aid of stochastic phenomena, or does chance exclude design?

– *Without a cause accessible to science or without any cause at all?* Unless one thinks that science provides a complete picture of reality, and that there is nothing outside science, one should not conclude from the absence of causality in the scientific description of an event, that there is no cause at all. God is not a physical cause, thus it is important not to confuse chance on the level of scientific explanation with the absence of transcendent determination.

[3] See the section 'Coincidental asteroid approach' of the article 'Chelyabinsk meteor' on *Wikipedia* for bibliographical information on those studies which favour a coincidence. Available at: <https://en.wikipedia.org/wiki/2013_Russian_meteor_event> [accessed December 18, 2013].

– *Indeterminism or unpredictability?* One could think (and Laplace thought) that the absence of chance guarantees predictability. Laplace's intelligence incarnates his conviction that all past and future can be calculated in a deterministic world, if only its state is completely known at one moment (Laplace 1814: 2). But in fact, this view is too simple. For there are stochastic processes which are perfectly predictable: Boyle's law correlates the volume, temperature and pressure of an ideal gas. The underlying molecular movements are stochastic, but their averages follow a strict deterministic law. At the same time, there exist deterministic systems with an unpredictable future. These are the famous 'chaotic' systems: although they are described by deterministic equations, the smallest difference at one moment will lead to exponentially divergent futures.

CHANCE AS EXPLANATION FOR DIVINE ACTION?

After these preliminary clarifications, let us turn to the central theme of this article: divine action in connection with chance. The first topic I want to examine more closely (in this and the next section) is the conviction of several scientist-theologians that chance is central to understanding how God acts in the world. They do not want to limit God's action to the preservation of the natural order, but want to make room for specific divine acts, without violating the laws of nature which God instituted at creation.

The problem they raise is the following: in a deterministic world, one can believe in general providence, because the world would not continue to exist and function as it does without the divinely given laws. But what about special providence? What about prayers which are answered, special blessings promised to the faithful? If they imply violating the laws of nature, one would need to understand why God does not respect the laws which he himself has given. If special providence does not violate natural laws, such a theistic world would strangely resemble a deistic world. For the deist, God abandons the world to its evolution following laws established at creation; for the theist, God remains active in the world. But its evolution would completely follow from the deterministic pre-established laws. Therefore this theistic world would have exactly the same history as a deistic world, if only initial conditions are the same. Same 'answers' to prayer, same blessings 'given' to the faithful.

For this reason (without rejecting general providence), some scientist-theologians look to chance, in order to provide room for divine action in what is left undetermined by probabilistic laws. They consider that one finds here the leeway necessary in order to understand how God enters into relation with humans, punishes their sins, answers their prayers... Unsurprisingly, quantum mechanics occupies centre stage: Robert Russell, founder and director of the *Center for Theology and the Natural Sciences* at Berkeley is currently one of the best-known advocates of the idea that quantum indeterminism is central to a good grasp of divine action.[4] Ian Barbour, who is often credited of being the father of the contemporary science-faith dialogue, favours another strange property of quantum systems: non-locality (Barbour 2006: 118). John Polkinghorne looks instead to the unpredictability of chaotic systems in order to make place for divine action in our world.[5]

Although these proposals try to make sense of divine action in the light of contemporary science, they face important scientific problems. With regard to quantum theory, research following up the EPR-paradox formulated by Einstein (J. S. Bell, Alain Aspect) has shown that quantum mechanics is not incomplete in the sense that it would leave gaps which could be filled by divine intervention. We have to be very cautious when transferring our common sense intuitions on causality to the reign of quantum mechanics. They were formed in the macroscopic world of everyday experience and lead us into error when applied to the quantum world. In addition, it is quite unclear, even if it were possible to 'squeeze' divine action inside the boundaries of what is left undetermined by Heisenberg's principle of uncertainty, that this would provide any leeway for significant action. In the analogous case of human action, Peter Clarke has convincingly argued that quantum effects are far too small to account for human freedom.[6] The hope that quantum indeterminism would provide an explanation of free (divine or human) action would seem to be an illusion.

[4] See Wetger-McNelly (2006: 96-111) and Polkinghorne (2006: 137-45).

[5] See Smedes (2004: *passim*) for a good presentation and critique of these proposals.

[6] For example, Heisenbergian uncertainty is more than 100.000 times smaller than what would be needed to change even the most feeble chemical bond. And in order to function at typical body temperatures, the brain must be stabilized against thermal noise. But thermal perturbations are about a billion times bigger than any quantum uncertainty. See Clarke (2010; 2014).

Concerning Polkinghorne's appeal to chaos, as far as we know, chaos only happens in classical systems, so that it does not introduce any true indeterminism, but only a lack of predictability.[7]

It follows from these considerations that, if there was a difficulty of allowing divine action in the deterministic world of classical physics, the indeterministic theories of contemporary physics would not be of any help. But let us remember that the founding fathers of classical physics (Galileo, Kepler, Newton, Descartes...) did not think that there was any problem for God to act in the world their science described. Not only was God as the Creator responsible for the natural order, but also, for example, Newton's immense interest in biblical prophecies shows that he believed in the God who continued to be active in the created world.[8]

GOD'S ACTION BEYOND THE SCIENTIFICALLY CORRECT

In fact, on reflection, the question is quite bizarre: How does God act in the world? It's *his* world. He has created it and continually sustains it by his providence. 'For in him we live and move and have our being', as Paul declared in Athens (Ac 17:28).[9] Thus there is no need to find gaps in the scientific description in order to make room for divine action. It cannot be limited to what chance leaves undetermined.

But there is still the objection that God would be inconsistent if he went against the laws he himself has instituted. In response, it should be noted that a law of nature only fixes the behaviour of a system as far as there is no external cause interfering with it: the pen falls to the earth according to the law of gravity – unless I put out my hand and retain it; two electrically charged balls move away from each other following Coulomb's law – unless a strong magnet is close by, which has to be integrated into the calculations ... Any law only applies if all acting causes are taken into account.

That is the reason why it is not correct to define a miracle as a *violation* of the laws of nature. It is instead the intervention of an external cause, and more precisely of a non-natural cause. Laws of nature describe what normally happens, under the condition that such an external action

[7] I explain more fully these scientific problems in Jaeger (2012a: 297-9).

[8] See Newton (1974a; 1974b).

[9] Unless otherwise stated, all Scripture quotes are taken from the New International Version.

(apart from general providence) is absent. The ordinary formulation of laws leaves this condition implicit, which leads to the wrong impression that such an intervention would violate them (Lewis 1960: chap. 8).

Some are unconvinced by such a line of argument and point to the beauty of a world where everything happens according to a small set of simple laws. But one might question the validity of such an aesthetic intuition: Is it up to us to decide what suits best for God's action in the world? An analogy may help us to understand that deviating from the normal rules may not lessen the overall beauty of a work. To the newcomer, any violation of the rules of grammar and style are forbidden when writing poetry, as he would be tempted to thus cover his lack of imagination and mastery of the language. But the accomplished poet allows himself, at certain chosen moments, to deviate from the rules, in order to create special effects. Far from impeding the beauty of the poem, these deviations better bring to light the author's intentions and underline the unity which the text finds in them.[10] In an analogous vein, the unity of what happens in the world is to be found in God's active will. Departures from regular patterns (which we discern as laws of nature) are not disconnected from the overall fabric of events, but serve, together with the 'normal' happenings, the plan of the one Creator and Governor of the universe.

For the Christian, laws of nature do not limit what God does in the world, and miracles are possible (and even real!). This fact takes away much of the motivation behind chance models of divine action. Does this means that there are two, and only two modes of divine action in the world: the preservation of the ordinary reign of natural laws (general providence) and miracles? It may be possible (but I recognise that this proposal is speculative) to view these two modes of action not as strict alternatives, but more as limiting cases, in between there is a continuum of operating modes through which the Creator is present and active in the world. Multidimensional models of reality, developed for example by Karl Popper and Herman Dooyeweerd may provide an inner-wordly analogy. They recognize different dimensions of reality, not all of which are accessible to a physical description.[11] In such a perspective, human thought and will is linked to physical processes (foremost in the brain),

[10] See Lewis (1960: chap. 8).

[11] See also Nagel (2012). Nagel argues for irreducible teleological and axiological principles at work in nature, albeit his resistance to any theistic reading of them.

but nevertheless go beyond what can be scientifically explained. Human liberty is not contradicted by the scientific description of these processes, but indicates that natural science does not capture all of reality. The control human thought exercises over bodily processes comes in a variety of degrees, from the instinctive, non-reflective response, at the one end, to the carefully pondered deliberation unhampered by any malfunctioning of the brain, at the other. It may be that we find here the best analogy, in order to understand various modes of divine action in the world.[12]

CHANCE: AN OBSTACLE TO GOD'S ACTION?

We have seen that it's not necessary to resort to chance, in order to make space for God's action in our world. Let us now consider a second question: does chance threaten God's sovereignty? It's quite curious to observe two opposing attitudes among believers: some hope that chance will solve the difficulty of understanding God's action, but others consider that chance is an obstacle which does not allow God to control everything. But both these positions are mistaken and neglect to take fully into account divine transcendence. God is not one cause among others, accessible to scientific description. Thus his action does not enter into conflict with natural causes, so that chance would be necessary, in order to make room for it. Nor is his sovereignty hindered by the absence of natural causes. For example, quantum indeterminism does not imply that God could only predict or determine events at the atomic level with a certain probability. It is true that quantum indeterminism is objective, but the restriction is only valid on the level of physical causality. As with any scientific theory, quantum mechanics doesn't limit what God can do.

As much as the Bible emphasizes that the natural order is grounded in creation, equally it insists on the control the Lord exerts over fortuitous events. A proverb states this conviction in a very straightforward manner: 'The lot is cast into the lap, but its every decision is from the Lord' (Proverbs 16:33). Most interesting are the texts which talk of *hòq* as imposed by the Creator's will to the sea. The sea, in the mythology of peoples around Israel, symbolises the forces of chaos, the disorder which threatens to wipe out humanity's vital space. To say that God's *hòq* is imposed on the sea, means that nothing can evade being determined

[12] For further development of these intimations, see Jaeger (2012a: 299-302, 307-10).

by it. The Hebrew word allows two translations: depending on the context, it can be translated as 'limit, border', or as 'law, rule'. In certain passages, it clearly has the second sense (Jeremiah 31:35-36; cf. Job 38:10; Proverbs 8:29):

> Thus speaks the Lord, who establishes the sun to light the day,
> the laws that govern the moon and the stars to light the night,
> who stirs the sea, and its waves roar,
> His name is 'Lord of armies':
> If these laws depart from before me, declares the Lord,
> the descendants of Israel will forever cease to be a nation before me.[13]

Thus divine sovereignty is not limited by what seems to humans to be out of control and unpredictable. On the contrary, what humans can't control and predict is completely submitted to God's reign. As Calvin wrote: 'It was a true saying of Basil the Great, that Fortune and Chance are heathen terms; the meaning of which ought not to occupy pious minds.' (Calvin 1845: I.XVI.8) More exactly, it's chance, in the sense of absence of a metaphysical cause, which doesn't have a place in the created world. No principle of chance independent of God's providence, no deity *Fortuna* or *Tychè* can compete with the Lord.

CHANCE UNDER GOD'S SOVEREIGNTY

But beware: don't confuse metaphysical determination with natural determination. Chance, in the sense of absence of natural cause, finds its place in the created world, as once more Calvin writes: 'Though all things are ordered by the counsel and certain arrangement of God, to us, however, they are fortuitous.' (Calvin 1845: I.XVI.9) As the biblical God controls all events determined by the laws of nature (and the initial conditions), he controls all events without a natural cause. Neuroscientist Donald MacKay states it in the following way:

> The God of biblical theism is beholden to none to account for his creative agency. If he freely wills into being a succession of events in which one half of the sub-microscopic details at any time are unspecified by their precursors, this would involve no inconsistency with his character, still less with his sovereignty, as portrayed in the Bible. (MacKay 1978: 30)

[13] My translation, see Jaeger (2010: 162-9, 150-3).

Faith in God's sovereignty does not necessarily lead to a deterministic, and even less to a fatalistic world- and life-view. For on one hand, God's decrees *transcend* the world. One cannot conclude from the fact that God 'works out everything in conformity with the purpose of his will' (Ephesians 1:11), to determinism on the level of natural causality. In the words of Calvin:

> We do not admit the term Fate ... For we do not with the Stoics imagine a necessity consisting of a perpetual chain of causes, and a kind of involved series contained in nature, but we hold that God is the disposer and ruler of all things. (Calvin 1845: I.XVI.8)

As the transcendent primary cause, God does not normally put aside secondary causes; on the contrary, he provides the necessary foundation, so that each creature can act according to its own constitution.

On the other hand, providence is the act of a *personal* God and does not come down to a blind, non-rational determination, unlike Stoic fate. In this way, we can admit, at the same time, God's absolute sovereignty over the world and the chance character of many events, when considered from within the world. Once again Calvin:

> As the order, method, end, and necessity of events, are, for the most part, hidden in the counsel of God, though it is certain that they are produced by the will of God, they have the appearance of being fortuitous, such being the form under which they present themselves to us, whether considered in their own nature, or estimated according to our knowledge and judgement. (Calvin 1845: I.XVI.9)

It is interesting to compare the biblical view with rival metaphysical conceptions and the place they can or cannot give to chance. First, scientism, which considers that science delivers a complete description of everything, that nothing exists which science could not, in principle, explain. Chance forces a limit on scientism: it has to recognise that science doesn't explain everything that happens, as certain things happen without any cause accessible to science. Second, deism, which considers that God, in the beginning, created the world, and left it then to the pre-established laws, without intervening any more. Chance forces deism to allow for realities which do not follow from God's original creation. Two solutions are on offer:

– Either the deist simply acknowledges that some events are not determined by the order which the Creator instituted in the

beginning, thus are (at least partially) independent of Him. But in a certain sense, this comes down to giving them a quasi-divine status, considering that they are their own cause. In fact, this is a form of (philosophical) polytheism.

– Or chance pushes the deist towards a higher view of providence: recognising God's continued action beyond initial creation makes space for events which are not connected to preceding events by natural causality, without giving them quasi-divine status.

To state it more bluntly: chance forces the deist to choose between polytheism and theism.

ORDERLY CHANCE IN A CREATED WORLD

As we have seen, it is possible to believe in God's sovereignty over everything *and* to accept that certain events count as chance on the scientific level. A clear distinction between the primary transcendent cause and secondary natural causes leads us to understand that something can be part of God's plan, without having a natural cause. Those who believe in divine omniscience and omnipotence should not be bothered by chance and its important role in contemporary science. But let us take a further step: Is it really sufficient to show that chance is no obstacle to faith in God? Many people stop at the scientific description of chance events. Why add metaphysics and talk of transcendent causality in the absence of natural causes?

The answer to these questions depends, above all, on the general attitude one has towards the Christian faith. Those who believe in the biblical God will resist the idea that transcendent causality is a more or less arbitrary add-on. On the contrary, somebody for whom this faith is mistaken could not accept the view that everything is grounded in the Creator and his action. The debate goes beyond the scope of this article and concerns the overall plausibility of the biblical worldview. Let us just mention two arguments which are directly linked to science and the role chance plays in it.

The presuppositions of science in harmony with creation

First, creation accounts for several central presuppositions of science. It explains the existence of a stable natural order, why this order is accessible to human knowledge, and why its exploration is a noble activity. The

biblical worldview even leads to the experimental method of modern science insofar as it sees creation as a free divine act: God could have given this world a different form or create different natural laws. It is not sufficient to reason about nature, but it is necessary to go and 'look', by doing experiments, in order to discover which world God has really decided to create. The good match between the doctrine of creation and the scientific method counts towards explaining why the Christian faith assisted the birth of science as we know it today.[14]

Chance and the creation of matter

Second, the form chance takes in a created world matches well with chance as we see it in contemporary science. The central notion in this context is the liberty of creation. Creation doesn't flow from God's nature, but from his will, as the book of Revelation sings: 'You created all things, and by your will they were created and have their being' (Revelation 4:11; cf. Ephesians 1:11; 1 Corinthians 15:38). Because of the freedom of the creative act, the world is not necessary, but contingent: it could not exist, and it could be otherwise than it is. This leads to a radically different understanding of the contingency of the world than in the Greek view of a world formed by a demiurge. As Wolfhart Pannenberg puts it:

> The transformation of the concept of contingency is that the contingent is now no longer based on the indeterminacy of matter, but on the freedom of God's will as the creative ground of the world and all its parts. (Pannenberg 1994: 1052)

Unlike the biblical Creator, the demiurge works on pre-existing, eternal matter, in order to impart form to it. This leads to a dualistic view: on one hand, form, reason, order; on the other, matter which eludes rational investigation. Creation doesn't admit such a dualism: God created *ex nihilo*; everything, including matter, comes from his hand. Therefore nothing in the created world is absolutely disordered or chaotic; nothing is radically irrational. This view is in accordance with the fact that chance in modern science is open to mathematical description. In fact, it is possible to formulate laws which govern random phenomena, even if only for their average values or their probability. Thus chance in science is no first principle opposed to form or order, as was Greek matter. This is not only true for 'games of chance', of which the tossing of a coin is

[14] See Jaeger (2006 : chap. 1 and 3).

the most simple and the most widely known. These games are in fact deterministic – but because of the complexity of intervening causes, we can't trace the exact evolution. 'Ordered' chance, as we expect it in a created world, happens even in quantum mechanics, although quantum theory certainly provides the purest form of chance we know of. The principle of causality doesn't apply universally; nevertheless it is possible to write down mathematical equations which describe microscopic processes. Quantum indeterminism does not imply the return of Greek irrational matter. The microscopic world contradicts, for sure, many of our intuitions acquired in the everyday world of mesoscopic dimensions. But quantum mechanics does not take us away from mathematical science which Newton and others constructed from the conviction that our world is created.[15]

CONCLUSION

Those interested in understanding God's action in the world should guard themselves against two (over-?)reactions to chance: chance neither provides an explanation for, nor is it a threat to divine action.

First, we have seen that chance does not provide an explanation for special divine action, which would include such action in the scientific world-picture. Neither quantum indeterminacy nor chaos theory provide the necessary leeway for divine action to happen without 'breaching' scientific laws. But we have also seen that chance models of divine action typically rely on a reductionist interpretation of the world. If physical science captures only certain aspects of the world, there is no need to look for a physical model of divine action. In fact, the most promising inner-worldly analogy may well be provided by human action understood non-monistically. As human thought and will are exercised through, but are not reducible to physical brain processes, God is actively present in His world. There is no need to look for a scientifically acceptable description of his action, as science does not fully comprehend all aspects of reality.

Second, chance does not hamper God's ability to act in the world either. As his sovereign control is not on the same level as the natural order, it is wrong to conclude from the absence of a natural cause to

[15] In fact, it has been recently possible to derive the probabilistic predictions of quantum mechanics from non-probabilistic axioms: Mittelstaedt (1998: 47-57). See Jaeger (2012b: 90-93).

metaphysical indeterminacy. As the transcendent Creator and Sustainer of the world, he freely chooses how to build the causal nexus of the created world. A created world leaves room for chance events, as God's decree is not to be confused with any inner-worldly deterministic order, or Stoic impersonal fate. In fact, creation provides a framework for the understanding of chance, which is akin to what we see in modern science. Not only do important presuppositions of modern science follow from the doctrine of creation, but also creation *ex nihilo*, with its corollary of created matter, excludes any radically irrational dimension from nature, so that we expect chance events to yield to some form of mathematical description.

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