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Creatio continua and divine action*

The notion of continuous creation requires for its validity a concept of God's continuing interaction with the world. The thinking of Arthur Peacocke on these issues is surveyed. The act of creation involves a divine kenosis, in which agency is shared with creation itself. The unpredictability of physical process is interpreted as indicating an openness of cosmic history, in which God acts through an input of information. This interpretation requires some form of argument from critical realism. Peacocke's ideas are subjected to a critical discussion and comparison with those of other authors. A discussion of anti-reductionism discriminates between weak and strong versions. Peacocke holds to the former but arguments are presented in favour of the latter.

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One of the great gifts that Arthur Peacocke has given to those of us concerned with the interaction of science and theology, is a positive concept of creation in the light of evolutionary history. He rightly says that 'any doctrine of creation, if it is not to become vacuous and sterile, must be about the relation to God to, the creation by God of, the world which the natural sciences describe'.¹ That implies taking absolutely seriously the interplay of chance and necessity, perceived to be at work in the contingently fruitful history of the universe. Writers such as Jacques Monod² and Richard Dawkins,³ have drawn from this the bleak metaphysical conclusion that cosmic process is 'blind' and purposeless. Against such claims, Peacocke has set out an alternative interpretation which gives due recognition to the potentialities with which matter must be endowed if any fruitful history is to be possible (the necessity of the Anthropic Principle) and he goes on to assert that 'These potentialities are written into creation by the Creator himself and they are unveiled by chance exploring their gamut'.⁴ Thus the role of chance is not the sign that the universe is a tale told by an idiot, but rather happenstance is the engine of novelty and the actualizer of potentiality. In an often-quoted phrase, Peacocke speaks of

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1 A.R. Peacocke (1979), *Creation and the World of Science* (Oxford: Oxford University Press), p.46. Cited as CWS.

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

3 R. Dawkins (1986), *The Blind Watchmaker* (Harlow: Longman).

4 CWS, p.105.

chance as 'the search radar of God, sweeping through all the possible targets of its probing'.⁵

The concept of *creatio continua* affords a natural expression of this evolutionary insight. 'The scientific perspective of a cosmos in development introduces a dynamic element into our understanding of God's relation to the cosmos which was, even if obscured, always implicit in the Hebrew conception of the 'living God', dynamic in action'.⁶ Clearly, the use of such language must amount to more than regarding cosmic history through theologically-tinted spectacles. There must be some actual divine activity present in the unfolding fruitfulness of the universe, though not necessarily an activity which can be disentangled from the flux of events in an itemised way. Hence the need when speaking of *creatio continua*, also to be willing to wrestle with the problem of how we can speak of divine agency in the world described by science. This is an area of interaction between science and theology of growing contemporary significance and it is likely, in my opinion, to continue to be an important area of development for some while to come. Naturally, Arthur Peacocke has made his contribution to the discussion.⁷

The matter calls for some theological delicacy. If God is the ground of all that is, then—in the sense that he maintains the world in being—he is party to all the events taking place in its history. The divine permissive will is a constituent part of every happening. Yet, theologians have traditionally sought to distinguish this universal divine acquiescence from the divine purpose will, which may be expected to be expressed in particular providential interaction as well as in the regularities of creation. Unless one is prepared to make the pantheistic equation of God and the world, such a discrimination seems essential to preserve a distinction between the Creator and his creation. Such a distinction is fundamental to much modern theology (as well as to classical theism) as it proffers the insight of the divine *kenosis* in creation in allowing 'the other' truly to be. Peacocke has usually sought to articulate his understanding in terms of panentheism⁸ which is commonly considered to see the world as in some sense part of God, though acknowledging that he exceeds the world. This can lead at times to language which has a somewhat pantheistic tone to it: 'God is in all the creative processes of his creation and they are all equally 'acts of God', for he is everywhere and all the time present and active in them and their agent'.⁹ Latterly, Peacocke has accepted a definition of panentheism as 'The Belief that the Being of God includes and penetrates the whole universe, so that every part of it exists in Him but (as against pantheism) that His Being is more than, and is not exhausted by, the

5 CWS, p.95.

6 CWS, p.80

7 See especially, A.R. Peacocke (1990), *Theology for a Scientific Age* (Oxford: Blackwell), ch.9. Cited as TAS.

8 CWS, passim; A.R. Peacocke (1986), *God and the New Biology* (London: Dent), ch.6. Cited as GNB.

9 CWS, p.204.

universe'. He sees panentheism as expressing 'an overt desire to hold together both the transcendence and the immanence of God in relation to the world', a desire which many would share without wishing to use panentheistic language. Peacocke goes on to say 'I have not wanted to imply an equally direct involvement of God in all events nor that all events equally and in the same sense affect God'.¹⁰ Some tensions seem to remain unresolved.

We are led to the need to see if we can in a scientific age speak with integrity of God's providential agency. Peacocke uses musical metaphors to considerable effect and one of his most celebrated and evocative passages speaks of God in creation 'selecting and shaping by his redemptive and providential action those [potentialities] that are to come to fruition—an Improviser of unsurpassed ingenuity'.¹¹ By what mode may we conceive that the Great Improviser actually touches the keyboard?

An eighteenth century world of clockwork mechanism could scarcely do more than accommodate a deistic Clockmaker who wound it up and let it tick away, with at most an occasional interference to redress a balance in danger of becoming precarious. Fortunately, twentieth century science has seen the death of mere mechanism. Not only has quantum theory revealed an elusive fitfulness present in the subatomic regime, but even the physics of the everyday has proved altogether more subtle than had been realized previously. Exquisite sensitivity to small triggers can result both in intrinsic unpredictability and also in the generation of large-scale structure in systems far from equilibrium. I think it is helpful to distinguish between the insights of dissipative systems (such as Bénard instability in convection) which generate patterns of long-range order, and the more general insights of the dynamical theory of chaos, whose ordered-disorder has a more open and developing character to it (in the explorations of a strange attractor). The former illuminate the origins of complex structure; the latter illuminate the possibility of a yet more flexible kind of becoming. It is these latter insights which seem more promising as a source of considering (however speculatively) questions of human or divine agency.

In order to make progress in this area, a gap has to be bridged. All would agree that the sensitivity of these chaotic systems to fine details of circumstance, makes them intrinsically unpredictable in their behaviour. That by itself is just an epistemological defect; we cannot know, beyond certain limits, how they will behave. Yet, if we want to move to talk of agency in a world of becoming, then we shall have to find a way to leap from epistemology to ontology, for we shall have to be able to speak of an openness to the effect of other causal principles present in what is actually the case.

It is not entirely clear to me how Peacocke wishes to make this leap. After a discussion showing that the behaviour of non-linear dynamical systems soon comes to depend upon fine detail to which Heisenberg's

¹⁰ TAS, pp.208–9.

¹¹ GNB, p.98.

uncertainty principle denies us access, he says 'On a critical-realist account of scientific knowledge, this means that we can say that such systems are indeterminate with respect to these microscopic properties (if not with respect to macroscopic properties of the assembly)',¹² where the latter parenthesis appears to refer to bulk properties such as temperature or pressure. If appeal is being made here to a macroscopic enhancement of quantum indeterminacy, some words of caution are in order. In the first place, until we solve the measurement problem in quantum theory, the whole way the microscopic and macroscopic interlock is problematic and unclear. Secondly, there are considerable unresolved perplexities about how chaotic behaviour relates to quantum mechanical systems.¹³

My own solution is also to appeal to critical realism, but in a somewhat different way.¹⁴ Because I believe that 'Epistemology models Ontology' (a succinct statement of the realist position), I am content to move directly at the macroscopic level from unpredictability to an openness to holistic causal principles. It is not a forced move, but it is certainly a metaphysically possible one, analogous to Heisenberg's treating his discovery that position and momentum could not simultaneously be measured with arbitrary accuracy, as an indication, not of ignorance, but of intrinsic indeterminacy. The apparently deterministic equations describing the 'bits' of classical physics are then held to be *downward emergent approximations* to a more subtle and supple reality, approximations resulting from treating parts as if they were separable from their whole context (which they cannot be, since exquisitely sensitive systems are also intrinsically unisolatable).

Unfortunately Peacocke does not appreciate my position correctly.¹⁵ Apparently, from concentration on one or two isolated sentences in a long and necessarily groping argument, he thinks that I envisage God 'as actually manipulating quanta, atoms and molecules in the natural world in order to produce the results he wills'.¹⁶ That would be the position of the late William Pollard,¹⁷ but it is not mine. The point is that for these sensitive systems, their vulnerability to small triggers, and their consequent vulnerability to their environment, show that they can only properly be treated holistically.¹⁸ Peacocke goes on to criticize what is not my position by saying that it would require 'that God does know the natural outcome of natural situations that are unpredictable to us'.¹⁹ Of course, I believe that God knows things as they actually are. If they are indeterminate—or better, open to other forms of causal action—than he knows them

12 TAS, p.50.

13 J.C. Polkinghorne (1991), *Reason and Reality* (London: SPCK), pp.40–41.

14 Polkinghorne (1989), *Science and Providence* (London: SPCK), p.29; *Reality*, pp.41–42.

15 Polkinghorne (1988), *Science and Creation* (London: SPCK), chs 3 & 5; *Providence*, chs 1&2; *Reality*, ch.3.

16 TAS, p.154.

17 W.G. Pollard (1958), *Chance and Providence* (London: Faber). Criticized as inadequate in Polkinghorne, *Providence*, pp.27–28.

18 Polkinghorne: *Providence*, p.29.

19 TAS, p.155.

in that way. Rather than assuming 'total divine omniscience and prescience about all natural events',²⁰ I believe that the *kenosis* of creation is such that even God does not know beforehand the unformed future.²¹

Arthur Peacocke and I both feel that the key model for describing God's particular and providential interaction with his creation is provided by the concept of 'active information'. He writes 'I have suggested that the influence of God on the world-as-a-whole might be appropriately conceived of in terms of a flow, an 'input', of information rather than of energy'.²² I have written of God that 'it is entirely conceivable that he might interact with [creation] (both in relation to humanity and in relation to all other open process) in the form of information input'.²³ We both note the consonance of this picture with traditional theological language of the Spirit 'guiding' or 'leading' creation, and believe that the preference for information over energy delivers one from the unacceptable notion of a demiurge, acting merely as a physical cause among causes.

In my view, it is important to discriminate the idea of 'active information' (obtained by taking the notion of chance in behaviour pattern brought about through the effect of infinitesimal disturbance and extrapolating it, in a metaphysical conjecture, to the case of zero energy-input) from the familiar idea, taken from communications theory, of information as the measure of the recording or transmission of the specification of pattern. These two ideas are quite distinct from each other and theorems relating to the latter have no relevance to the former.

The novel feature of this contemporary discussion of divine agency lies in the perceived need to discuss, however tentatively and speculatively, how there might be scope for providential causality within the scientifically discerned process of the physical world. Theological writers have tended to dismiss this question too readily by invoking a premature recourse to mystery. Austin Farrer rebutted those who seek to understand the 'causal joint' by which Creator and Creation interact, saying 'the result can only be (if we take it literally) monstrosity and confusion'.²⁴ Peacocke robustly responds to such criticism by saying 'without some plausible (certainly not mechanistic) account of how God might interact with the causal nexus of individual events in the world, including human-brains-in-human-bodies, we cannot with integrity assert that God does, or might, do so'.²⁵ No one could deny the boldness involved in trying to conjecture how God may interact with his creation, nor refuse a necessary humility about how successful one could expect to be in the inquiry. Yet to attempt some discussion is surely obligatory for theology in a scientific age.

Almost equal boldness and humility is called for in the comparable quest to understand human agency. One of the attractions of the concept of

20 TAS, p.155.

21 Polkinghorne: *Providence*, ch.7.

22 TAS, p.164.

23 Polkinghorne: *Reality*, p.45; cf. *Providence*, pp.32-33.

24 A. Farrer (1967), *Faith and Speculation* (London: A & C Black), p.62.

25 TAS, p.150; cf. Polkinghorne: *Providence*, pp.11-13.

'active information' is that it offers a glimmer of hope that this might also be a fruitful direction in which to think when considering the perpetual puzzle of how mind and brain are related to each other. It has been a widespread practice to appeal to some form of analogy between human agency in our bodies and divine agency in creation, although the power of this appeal has been restricted by our manifest ignorance of how it comes about that we are able to execute our willed intentions in the physical world of which we are inhabitants. At its most direct (and unsubtle) this analogy has been exploited by some by means of talk of divine embodiment in the cosmos. This is firmly rejected by Peacocke. Not only does the universe not look like an organism but 'the problem of the existence of evil becomes particularly intransigent if the world is God's body, for then evil becomes a part of God's own being'.²⁶ I agree, having noted also that

Both we and God exercise the holistic power to influence, respectively, our bodies and the world by means of causal joints hidden within the unpredictability of process. Yet there are differences between human and divine participation in the world, that go beyond the contrast of scale between the limited and unlimited. The most important is that we are constituted by our physical bodies and so are in thrall to them . . . God, on the other hand, is not constituted by the cosmos, even in part of his nature, and so he is never in thrall to it.²⁷

So we return to the question of the causal joint and how it might be that there is sufficient flexibility in physical process to afford the opportunity for the exercise (either human or divine) of top-down causality through 'active information'. The assertion that this is so is, in one sense, a part of the robust anti-reductionism which has been so persistent and valuable a contribution made by Arthur Peacocke's thinking: 'There is no sense in which subatomic particles are to be graded as "more real" than, say, a bacterial cell or a human person, or even social facts'.²⁸ There are, however, two forms of anti-reductionism. One, which we might call 'weak anti-reductionism', acknowledges that new levels of being call for new concepts (we do not have 'wetness' till we have billions of H₂O molecules), but sees these as direct, if usually incalculable, consequences of the accumulation of unmodified lower level processes. The other is 'strong anti-reductionism', which believes that higher level entities induce a modification in the behaviour of their constituent parts. Emergences such as wetness, or the long-range order of dissipative processes, like Bénard instability, may well be explicable on the basis of weak anti-reductionism. It is far less clear that this is so for qualitatively novel emergences, such as life, or consciousness, or self-conscious agency. These seem to me to call for some form of strong anti-reductionism—hence my concept of 'downward emergence' as applying to our attempted descriptions of the behaviour of constituent parts, treated as if isolatable. I have called such a notion *contextualism*,²⁹ for I

26 TAS, p.168.

27 Polkinghorne: *Providence*, p.34.

28 GNB, p.28.

29 Polkinghorne (1994), *Science and Christian Belief* (London: SPCK), ch.1.

believe that parts can have their behaviour truly modified by the wholes that they constitute. In my view, chaotic dynamics should be interpreted as indicating that the causal nexus of parts is not drawn so tightly as to exclude the operation of holistic causal agencies.

If I understand Arthur Peacocke correctly, he is a weak anti-reductionist: 'It is important to emphasize again that recognition of the role of such "top-down" causation in no way derogates from that of "bottom-up" causation'.³⁰ Later he writes:

Particular events could occur in the world and be what they are because God intends them to be so, without at any point any contravention of the laws of physics, biology, psychology, sociology, or whatever is the pertinent science for the level of description in question. Furthermore, we should expect the irreducible unpredictability, open-endedness and flexibility that characterize lesser complex dynamical systems within the world also to be a feature of the world-as-a-whole, rather in the same way that the succession of human brain states has an unpredictability (from the outside) that may be related to human freedom. Might not this be the correlates of divine freedom in relation to the world?³¹

I must confess I remain puzzled about how exactly Peacocke relates the epistemological property of 'irreducible unpredictability' to the ontological properties of 'open-endedness and flexibility'. He often refers to the example of dissipative systems to illustrate how holistic correlated behaviour is compatible with unmodified microscopic process, but I have already indicated that I believe this example can only take us so far, since it refers to behaviours still predominantly energetic in character, with patterning which is simple, if striking. In looking to a careful and cautious strong anti-reductionism, I do not think one is risking the pejorative adjective 'vitalism', for it is not some magical extra ingredient which is being invoked, but an ontological influence of context on behaviour.³²

There is one technical question which must be faced by those who want to talk about 'active information'. There are well-known results for the recording of information through physical interactions, due to Brillouin and Szilard, which correlate input of information with a corresponding irreducible input of energy.³³ It seems clear to me that to apply this to God would be to treat him as a demiurge, a cause among causes. It would also require, for its application, a decision about what was to be assigned as the divine temperature! (Presumably, the natural chilling answer would be 3°K, the temperature of the cosmic background radiation.) However, the application of the Brillouin-Szilard theorem would also be a scientific mistake, for we have seen that 'active information' is different from the information talked about by communications theorists. Peacocke is

30 TAS, p.54; see also, GNB chs 1-4, especially pp.18-20.

31 TAS, p.159.

32 cf. a process point of view in I.G. Barbour (1990), *Religion in an Age of Science* (London: SCM Press), pp.222 and 225.

33 Polkinghorne: *Providence*, p.32; TAS, p.164.

concerned about the supposed problem and he says 'This seems to me to be the ultimate level of the 'causal joint' conundrum, for it involves the very nature of the divine being in relation to that of matter/energy'.³⁴ I believe, that, in fact, we may here perceive some faint clue about what is special in the Creator's interaction with his creation and why the language of Spirit is traditionally employed.³⁵

Divine action is an important topic in the contemporary science-and-theology debate. The apparent loosening up of the structure of the physical world, which has been so striking a development in twentieth-century physics, has encouraged the thought of a physical world hospitable to concepts of agency. The dead-hand of the Laplacean calculator is relaxed, though what this actually implies for ontology requires a careful and scrupulous discussion. The engagement in this debate also reflects a growing acknowledgement that science and theology cannot conduct their dialogue simply at the frontiers of creation and natural theology, but have to be prepared to penetrate more deeply into areas where prayer and providence and theodicy set the agenda. Peacocke is surely right to say that 'belief in divine providence is founded existentially on Christian experience, indeed on religious experience in general, and forms the presupposition of prayer, worship and daily lives of believers in God. It is not, therefore, to be summarily dismissed and subsumed under the more abstract categories of the creative and sustaining activity of God'.³⁶ I agree with him that a deistic 'single great sustaining act' account of God's relation to creation,³⁷ is not enough.

The debate will continue and Arthur Peacocke will continue to make his valuable contributions to it. May I end with a plea? All of us currently writing in this area are seeking to find some account of divine action which is consistent and continuous in character, reflecting that unyielding steadfastness which is part of the divine nature. None of us wants to speak in terms of fitful or occasional divine activity (though consistency is, of course, different from mere uniformity, so there may well be events in which God's providence is more readily discerned by the faithful than in others). Let us then, all recognize that 'interaction' is the term which all are seeking to affirm and let us refrain from trying to pin the pejorative term 'intervention' or 'interference' on those whose proposals do not match our own in every detail.

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34 TAS, p.164.

35 See the discussion of my 'The Metaphysics of Divine Action', in R.J. Russell, N. Murphy and C.J. Isham (ed.) (to be published), *Chaos, Complexity and Self-Organization* (Vatican City: Vatican Observatory).

36 TAS, p.136.

37 See M. Wiles (1986), *God's Action in the World* (London: SCM Press).