
DAVID A. BOOTH

Neither Lifeless nor Mindless

A commentary on “Reason, Science and Faith” by Paul Marston and Roger Forster, Monarch Books, 1999.

Roger Forster and Paul Marston provide an excellent introduction to “big questions” about God and science in this re-write¹ of their earlier book. As a fellow theist and believer in the authority of the Christian Bible, and as a philosophically aware research scientist, I have no serious disagreement with their positive statements. Their brief treatment of principles both of scholarly biblical interpretation and also of academic philosophy of science is judicious in its definite conclusions where these can be drawn and in its openness to alternatives where these should be recognised. Nevertheless, there are some important gaps in their treatment of current scientific knowledge of biological and psychological mechanisms and indeed of the social content of human life. This short article seeks to characterise the basis of these weaknesses and to point to some potential correctives to their position and to the wider consensus that they represent among, for example, several contributors to this Journal.

Understanding Genesis

Marston and Forster concentrate on issues in the interpretation of the early chapters of the Book of Genesis. They detail the divergences of the recent wave of “young-earth creationism” from respect for the plain character of the biblical text and also (building on Marston’s PhD work) from leading theologians’ understanding of the relation of the creation accounts to the science of their times, back to the early Church Fathers and up to the Victorians before and after the publication of Darwin’s *Origin of Species*.

Their thorough treatment is important because contention over these matters is causing considerable distress and indeed damage in some Christian groups. However, any involvement in such controversy risks isolating these passages in Genesis from the rest of the Bible. The handling of Genesis becomes sub-Christian when it neglects the central concerns of both the Old and the New Testaments with God’s creative work in contemporary human lives, minds and societies. Indeed, there may be merit in considering the first part of Genesis as an inspired paring back of popular stories about origins in order to convey monotheistic prophecy to the human condition in any age, and not so much as an explanation of where we came from.

1. Roger Forster, Paul Marston [cover]; Paul Marston and Roger Forster [flyleaf] (1999), *Reason, Science and Faith*. Crowborough, East Sussex: Monarch Books.

In the course of their critique of mistreatments of early Genesis, Forster and Marston present Henry M. Morris as a guru of the self-styled 'Creationists.' Their book amply demonstrates that Morris's writings are riddled with errors about the scientific advances in geology and paleontology in the 18th and 19th centuries, as well as departing from the usual approaches by conservative biblical theologians to early Genesis.

However, some of the book's animadversions on Henry Morris betray an attitude that may account for its limited consideration of the theologically relevant sciences of the processes of life, mind and society. On page 189, Marston and Forster write, "To argue, as does Morris, that [the Bible] was written to be understood and 'therefore must be literal' is arrogantly [to] read a modern engineer's culture into a setting to which it is entirely foreign." By itself, that might be taken merely as an *ad hominem* substitution of "engineer" for, say, "newspaper reader" – the usual way of making this point. However, they become downright condescending to the whole of Morris's profession on page 247: "To be fair, Henry Morris' approach to language probably works well enough in engineering [but] he simply cannot seem to grasp the fact that[,] if a picture is being used metaphorically, then details in it are just part of the metaphor." This remark is inconsistent with the cogent views expressed elsewhere in the book on the openness and flexibility of scientific language. So the authors could be betraying a (distinctively recent English) view of engineers as rather unsophisticated. They might even have in mind the stereotype of the gentleman in a back-street repair garage who keeps old cars on the road and reads one of the daily tabloids!

Whether or not as an academic engineer Henry Morris himself carried out scientific (or literary) research, Roger Forster and Paul Marston refer to the whole "culture" of engineering. In fact, the engineering profession is built on theoretically, conceptually and mathematically sophisticated applications of physics to human constructions. Indeed, many leaders in the founding of the modern science would nowadays have been proud to call themselves engineers, as do a substantial body of present Fellows of the Royal Society. In competition with fundamental scientists, engineers in the U.K. receive a large slice of the public funds for research that are distributed by the Engineering and Physical Sciences Research Council and also the Biotechnology and Biological Sciences Research Council.

Limitations of the physical sciences

Overreliance on 'pure' physical and molecular sciences would seriously weaken an attack on unbiblical notions of divine creation. Marston and Forster do criticise the preconception that DNA sequences explain all life. Yet they miss positive opportunities to illuminate the full thrust of the Bible's teaching about the Creator, using the understanding of God's world that has been gained by the organismic biosciences, by scientific psychology and by systematic empirical

research into human society.² Indeed, physiology, psychology and (if it exists) the sociology of historical institutions can all in some aspects be viewed as ‘engineering’ sciences. The only difference from engineering in the common use of that term is that the ‘machinery’ of the human body, of human minds and of human culture is natural, rather than artificial – or (as I would rather say) pro-created, rather than invented.³

The sciences of the mechanisms of human (and animal) living have been enriched by affinities with engineering beyond mere analogy. The key relation to engineering sciences is not a mere dependence for practical purposes, a dependence which of course the research fields of biology, physics and chemistry all display. The fundamental theoretical structure of a number of branches of physiology and of psychology arguably is similar to that of engineering and unlike that of fundamental physics, of most or all of chemistry (my first master’s research discipline), and of much of geology, paleontology and genetics. These latter sciences might perhaps be considered to be parts of a system, such as cosmology, Gaia and evolution respectively. Yet physiology and psychology each consist primarily of the study of highly organised systems, within the body or the mind.

An illustration from my first decade in research into brain, body and behaviour^{4,5} is the transfer of Control Theory from engineering to physiology in the 1960s. Quantitative analysis of interacting feedback and feedforward mechanisms tested the adequacy of theories of thirst and hunger, for example, in ways that verbal interpretation of data could not. More generally, a recurring theme in the last 60 years of theoretical development in my main profession of psychological science has been the deep absorption or the creative rejection of physical engineering concepts. These ideas came from communication theory in mid-century, from perceptions in the 1960s and neural nets in the 1980s, and from the latest styles of computer simulation, programming language or software engineering such as the multi-agent computing of today. Most social psychologists have not regarded concepts directly from engineering as helpful; nevertheless, in my view, multi-layered “systems thinking” about function and structure can be a considerable strength in research into interpersonal or cultural processes.

That is to say, a distinction should be drawn between ‘historical’ (or descrip-

2. One of Marston’s mentors, Karl Popper, famously contributed to arguments about the (im)possibility of social science, as well as to the philosophy of science as cited in this book.

3. The more usual term for ‘engineering sciences,’ and indeed the more appropriate phrase in most contexts, is ‘system sciences.’ Nevertheless, I beg the indulgence of my colleagues in Engineering for expository purposes in this particular context. The points that need to be made here about fleshy, cognitive and social systems can also be made about technologies ranging from electronics and (notoriously) computing to the design of bridges or of automotive engines, while the more accurate word ‘system’ is liable to turn off anyone who has had a brush with Systems Theory.

4. F.M. Toates and D.A. Booth, 1974, Control of food intake by energy supply, *Nature* 251, 710-711.

5. D.A. Booth (ed.), 1978, *Hunger Models: computable theory of feeding control*. London: Academic Press.

tive) aspects of evolutionary biology, considered by Forster and Marston, and its 'mechanistic' (or explanatory) aspects, e.g., evolutionarily stable behavioural strategies and other ethological aspects of quantitative ecology.⁶ Similarly, genetics or cladistics as descriptive disciplines, and even current triumphs of gene sequencing (structural genomics), are quite distinct from the cellular biochemistry of genetic expression (functional genomics) as it operates through metabolic pathways and by the cell-tagging, diffusion gradients and other mechanisms by which 'homeobox' genes and other organisers are thought to coordinate the regulated development of structures such as limbs, eyes and brains (to which Marston and Forster allude). However, even this mechanistically obscure conception of organ development is arguably overreductive, precisely because it is couched in molecular terms, rather than as higher-order systems.⁷

Cosmological physics is at the chaotic end of the same contrast between agglomerations and functional systems. It seems theoretically viable to allow that the origins of the universe could be in random processes among unorganised fundamental particles, strings or whatever. Yet that ancient atomistic reductionism gets nowhere with cellular machinery, such as the quantitative regulation of interactions among metabolic pathways.

Random interactions affecting reproductive success also seem a viable basis for empirical theory about the observable residues of the origins and co-evolution of species and ecologies on this planet. Yet neglect of the systems within which genes are expressed makes it totally mysterious how a change in a few genes can radically alter a structure developed in an individual organism, as Forster and Marston mention. The incoming medical genomics needs classic clinical science, and indeed also behavioural science and cultural scholarship, before the imminent completion of the complete sequencing of the human genome will make a serious impact on the common polygenic and environmentally contingent human diseases.

Is physics the basic science?

Rutherford thought that the physics of fundamental particles was the only real science and all the rest was mere stamp-collecting. He could only imagine that this was so (as did many philosophers of science of his generation) because he lived just before the elucidation of functional metabolic cycles in plant and animal cells, and quite a while earlier than systematic experimental testing of theories about the mental mechanisms required for reading or for a normal child to learn how to see life from another person's point of view. Schrödinger could suppose that a resolution of quantum uncertainty by observation would

6. J.R. Krebs and N.B. Davies (eds.), 1997, *Behavioural Ecology: an evolutionary approach* (4th edn.). Oxford: Blackwell Science.

7. B.C. Goodwin and P. Saunders (eds.), 1992, *Theoretical Biology: epigenetic and evolutionary order from complex systems*. Baltimore & London: Johns Hopkins University Press.

determine whether a cat dosed with poison was alive or dead, only because biochemistry and neuroscience were still not mature enough for physicists to realise that they should ridicule any of their number who supposed that there remained a scientific issue in the difference between being alive and being dead. Rutherford's successors no longer pooh-pooh astronomy as counting stars. Indeed, they blush to be called "atomic physicists" now that physics includes cosmology. Observational astronomy as well as particle-smashing has proved to be a testbed of fundamental physical theory, from relativistic effects in Mercury's orbit to measuring the background microwave radiation and searching for black holes or the missing interstellar mass (if different!).

In other words, even physics in its contemporary sense cannot be reduced to the Basic Science of Physics as materialist ideologues had dreamt until the final decades of the 20th century. Even inorganic molecules are beyond prediction from quantum mechanics. Natural physiological and ecological systems and engineered artefacts operate on principles that emerge from nothing within the whole of physics and chemistry combined, while doing so without infringing any of the laws to which physicochemical materials are subject.

Similarly, an inclusive overview of recent decades of psychological research undermines any notion that the mind is explicable by brain processes alone or by environmental processes alone (notwithstanding views expressed by Christians and atheists in both camps). What a person achieves and experiences is the product of a system of unconscious and conscious mental systems that has developed during a lifetime of transactions between the genetically informed brain and body and the historically informed culture and community. Programmes of physical or 'non-physical'⁸ reduction of mind to brain (or, at the other extreme, to deconstructable narratives, as some social scholars purport) fail to accommodate a large proportion of the plain facts.

It should be noted that these views are stated for their plausibility, not as universally accepted. They are contested for example by some of those heavily committed to expensive bioscience such as gene sequencing or brain imaging. Much like Rutherford, Watson has said that all real science is physics and the rest is sociology (though the funding of big-machine physics looks like sociology too!) Yet his co-discoverer of the genetic code, after studying the more basic functions of visual perception, has recognised how much more what we do and feel is beyond an unorganised concatenation of neuronal interactions.⁹

Indeterminacy and free will

To give an account of human free-will, Marston and Forster cite Pollard's invo-

8. W.S. Brown and M.A. Jeeves, 1999, Portraits of human nature: reconciling neuroscience and Christian anthropology, *Science and Christian Belief* 11, 139-150.

9. F. [H. C.] Crick, 1994, *The Astonishing Hypothesis: the scientific search for the soul*. London: Simon & Schuster.

cation of quantum uncertainty and advocate their own and Polkinghorne's recent developments of the idea. They seem unaware how misconceived is such an application of physics to the high-level organisation of psychological systems of human decision-making. Quantum uncertainty has no relevance even to a malfunctioning lottery machine (let alone to extreme weather, so beloved of deployers of chaos theory in this context) and so can hardly bear on the obviously much more complex mental mechanisms of choosing.

As philosophers pointed out when this line of thought was first suggested, freedom of the will cannot be a bias in random processes of decision-making. It is deciding – and acting – for one's own reasons (good or bad) rather than under the sway of non-rational factors, let alone being forced by external constraints. The brain is not a randomising machine (which, note, has to be highly structured in order to avoid biases) nor even a chaotic system. It was shown by the neurophysiologists 50 years ago to be highly regulated machinery, ruled by negative-feedback control such as that exerted by recurrent inhibition (synapses that reduce excitation in the pathway that activates them). A rationalisable decision between alternatives must involve coordination across millions of multisynaptic pathways, strictly specified by their past causal connections to the environment through the senses and the muscles.

Furthermore, accounts of mental processes in terms of quantum physics make no sense within molecular neuroscience. Quantum uncertainty does not leave open any difference between even a helium atom and a tritium atom. So, it is unlikely ever to trip one way or another an intermolecular interaction as large and overdetermined as a neurotransmitter ligand-receptor process. The apparently random noise in synaptic transmission is observed and generated at the level of membrane structure, e.g. by thermal and Brownian motions, far above the level of quantum uncertainty. Even so, the basic fact is that determinate information transmission can occur despite synaptic noise, because that cognitive performance depends on the locations in the brain of orderly sequences of nerve cell interactions.

So, the notion of a bias on quantum uncertainty is plainly irrelevant to the natural engineering of human decision making. The events in the brain and body and in the external setting for the task in hand that matter for thought, feeling and action are not the statistics of electron clouds. Rather, they are organised supramolecular and supracellular processes, similar to the effectively operating entities that engineers create out of hitherto useless materials.

Mind, brain and society in a unitary universe

When the Nobel neurophysiologist J.C. Eccles attempted to move out of his own field into psychological science, and to address issues about human nature on the interface of philosophy and Roman Catholic doctrine, he was mired in fallacies about private experience that philosophers had resolved some decades earlier. As a result, he left the mind boxed into an introspective consciousness

buried in association cortex.

Eccles was less realistic about engineering than the Renaissance philosopher, Descartes. The codifier of the dualism of “the ghost in the machine” took his model of body-mind relationships, not from any part of basic science but from some advanced engineering of his time – the hydraulic statues at Versailles. He correctly suggested that heat stimulated nerve endings in the skin and sent a message to the brain that resulted in the person suffering pain. He was wrong to invoke a flow of fluid as the medium, rather than a travelling wave of ion movements along a nerve fibre. Yet this error was far from foolish, because pipes of fluid worked the statues, and the notion of electrical current was then unknown. His suggestion of the pineal as the central relay was sensible enough for the cerebrospinal fluid in the ventricles alongside. However, Descartes did not consider the problem how a pulse of fluid reaching the pineal could result in the particular pattern of contraction of muscles that was likely to remove the hand from the heat. Modern knowledge of neuromuscular systems readily accounts for a simple movement pattern of this sort.

Forster and Marston (page 99) rightly point to the difficulty of distinguishing this Cartesian mind-body dualism from current two-aspect neuropsychology (recently reviewed briefly in this journal¹⁰), once each position has been realistically qualified by its proponents. This inconclusive hedging arises because both physicalist reduction and substance or property dualisms are “flies buzzing in the bottle” of linguistic abuse.¹¹ This whole philosophical framework can be sustained only by ignoring contemporary science of engineered systems.

The outworking of systems-blind language-use in dualism has problems that were spotted by classical Greek philosophers. As soon as the language of philosophical ontology was invented (one Substance or many?), it was reduced to absurdity by Heroclitus for even the merely random agglomeration of a river: there only ever is one river of water between a particular pair of banks, and yet it is never the same river of the water that we step into or cross over. It makes even less sense to divide types of reality among, for example, (1) what (if anything) it is like to be the running supercomputer program Deep Blue while beating the human chess champion of the world, (2) the hardware circuitry changes as Deep Blue wins, (3) the software operations in that event, and (4) the objectively real part of that historic achievement by Deep Blue in the social institution(s) of world chess. Clearly we can draw these distinctions but no engineer would begin to worry about which of them is really Deep Blue, let alone treat Deep Blue as a mixture of at least two of these four entities that interact causally – if not like balls on a snooker table, then how?

10. D. [A.] Booth, 1997, Human nature: unitary or fragmented?, *Science and Christian Belief* 10, 145-162, and references cited there.

11. L. Wittgenstein, 1953, *Philosophical Investigations*. Oxford: Blackwell.

Only one ontological dualism is required biblically, as Donald Mackay emphasised in his early writing – that expounded from Genesis 1 to Revelation 22, between God and God’s creation. In whatever ways God may be immanent, God also transcends the creation. Concerning the whole of that created order (or ‘nature’ or ‘the universe’, if we must find another term than ‘creation’), I am both a non-physicalist monist (there is one created reality) and a systems level pluralist.

That is, I am claiming that philosophical naturalism is not coherently or realistically physicalist or materialist, let alone atomistic in its physicalism. The scientific description of a steam engine and even of a flint knife is beyond the scope of cosmology and quantum mechanics. Similarly, there is nothing physical except interacting atoms about plants and animals (alive or dead) or human minds and societies (fallen or redeemed). Yet physiology and ecology are beyond physics, as also is the biosocial cognition of human life, ethical or aesthetic evaluations within it, and spiritual status before God.

Theistic creationism versus deistic modernism

Marston and Forster show that the mainstream traditions of Christian interpretation of the Book of Genesis have always acknowledged the options for biblical interpretation that were consistent with contemporary science. In the 19th century, aeons of geological change and of the appearance and extinction of plant and animal species were becoming common scientific currency, before Darwin’s publication of *Origin of Species*. Conservative theologians had no problems with the changing views of scientists in the face of new discoveries in the rocks. Their position became that, on the evidence, many millions of years of biological evolution is the way that God has created and sustained the human race and the other animal and plant species alive today.

Those who take the young-earth approach to early Genesis dub this position “theistic evolutionism”. This label is accepted with some reluctance by Forster and Marston, because they see themselves quite rightly as biblical Creationists. The young-earthers are superficial modernists, who treat Genesis like an ancient soap opera or even as God’s dictation to Moses of the script for a documentary.

The concession to such tendentiousness is unnecessary. The “young-earth creationists” are not theistic at all. They are deistic. Obsession with the first chapters of Genesis has led to neglect of explicit teaching in the Psalms, Isaiah, the Gospels, Colossians, Hebrews and elsewhere, that God has continuously created and sustained the universe and everything in it from before time until after the end of time, and indeed outside time itself. So, young-earthers should be labelled “deistic creationists”, leaving the label “theistic creationist” for Marston and Forster (and me) to lay claim to. There may however be a legitimate role for another term than ‘creation’, for use when its polemic overtones are unhelpful. The usual secular term is ‘nature’ (or ‘the universe’). ‘Nature’ has the disadvan-

tage of being contrasted with ‘society’ (or ‘civilisation’) in some uses, such as the natural sciences versus the social sciences (a categorisation that, if mutually exclusive, fails to accommodate the science of psychology). If nature in the broadest sense, including human society, can be taken to be effectively the same as creation but without overt implication of a Creator, then possibly better terms than theistic creationism or evolutionism would be incarnational or messianic (i.e. Christian) naturalism. The term ‘incarnational naturalism’ is in contradiction to the familiar atheistic Humean naturalism, which disallows any possibility of divine intervention in history. Perhaps the Elohim of Genesis 1-3 are Yahweh in action, intervening in nature as the spirit broods over chaos or nothingness, and like a father talking to his children in the garden after work, and also in the Jewish Messiah whose heel was bruised to save the world.

The book is very clear that the fully theistic view of Creation is that God sustains the whole universe at every moment (pages 128-135). Nevertheless, its exposition of creation theism, and much of the writing of Christians and others whose familiarity with science is limited largely to academic physics, seems perilously close to the young-earth deism in its neglect of the whole Bible’s focus on human motivation, intellect, physicality and sociality. On such a view at its most limited, God initiates and sustains the fundamental physical constants and leaves the world alone to “evolve”, except perhaps for biases on quantum indeterminacy in synapses around the brain that by some neuro-physiologically and sociopsychologically unaccountable miracle gives rise to human minds (and of course God’s historical intervention in Jesus Christ to redeem the world). The biblical view, rather, is of a fathering God in continuous interaction with a loved creation, rescuing the universe from humanity’s refusal to acknowledge our Creator, not only through the obedience of his incarnate Son but also with the pouring of his Spirit into the personal and social lives of ordinary believers acting for him.

To sum up, all creation (the natural and social world) is sustained by the transcendent God. In addition, God intervenes from outside nature and society, uniquely by the Incarnation in Jesus Christ but also by the Holy Spirit, most fully now in believers at one in the Body of Christ, the church.

Order from chaos

This firmly theistic interpretation of the first chapters of Genesis as an account of God’s ongoing and pervasive creative activity has implications that there is not the space here to develop fully or to connect with related theological thinking. One possibility is an extension of the traditional doctrine of divine creation *ex nihilo* to resonate better with the “engineering” approach to physiology, psychology and sociology than do the dualist or physicalist discussions that Foster and Marston cite.

In the first Genesis account, God created the universe out of chaos, not out of absolute nothingness: the “void” was in the lack of “form,” system or orderli-

ness. Nevertheless, that creation has universally been characterised theologically as out of nothing, *ex nihilo*. God created living creatures in the oceans. This also has been considered to be *ex nihilo* and yet creation out of the material of the oceans was not excluded by theologians aware of spontaneous generation as a scientific option.

In the second account, God created human life out of the dust of the earth (to which we return, like the grass), with water (to give clay) and air (as the breath of life). Yet should not biblical 'evolutionists' regard this also as creation *ex nihilo*? (Indeed, if the miracle of the resurrection body is like the plant arising from the dead seed, does not the Sustainer of the universe routinely create the crops *ex nihilo*?) In this account, God created a basic element of human society too, by generating a partnership (both male and female) out of one individual. God created culture as well, we learn following the picture of human breach of love for the Creator – institutions such as agriculture, work and parenthood. Were not then such socio-economic systems created *ex nihilo* too?

Human beings also create new individuals from nothing more than animal seeds. In the light of the above examples, it is difficult not to regard this procreation of our own kind as *ex nihilo* as well. It seems to follow that human individuals within historical culture have procreated social institutions such as parliaments and religions, biosocial institutions such as animal husbandry, plant and animal breeding and the family, and physical institutions (technologies) such as agricultural implements, carts, boats, automobiles and aeroplanes.

Each true invention is a human creation that came from nowhere, with nothing like it existing before. Evolution, life, mental performance and consciousness are nothing to do with biases on randomness or butterflies stamping their bifurcations on chaos. They have everything to do with structure being created out of no structure, or novel or higher-order systems within older and simpler systems.

If God were not fully active right now, there would not just be chaos; there would be nothing, including no creatures in His image for Him to love. That is, not only was the creation of all form out of chaos and the creation of our world and our race in Adam out of nothing, but also this page and print, this historical culture that gives the print meaning, and you and I, have been created *ex nihilo* and are being preserved from nothingness by God's express will until any moment in time that He chooses to stop.

Thoroughgoing theism and the problem of suffering

Developments in scientific 'systems thinking' about God's creation may also come to cast some additional light on the issue of innocent suffering. A long-standing partial answer to the problems of evil has been that God has provided healers. The medical technologies that we are now discovering at an accelerating pace are part of God's creation. Now that psychologists and others are beginning to work towards evidence-based health and social care, it is biblical

to expect further rich resources to come to light that God creates in order for us to reduce and to prevent suffering that does no good.

Yet part of the mystery of suffering could be that humanity was created to discover not only the cures that are possible but also some larger purposes that give meaning to apparently arbitrary disaster. Epidemics and famines, like wars, are not merely challenges for economic and social change to counter the stupidity of underplanned development and to contain the evils of exploitation of the poor. They can also be seen as divinely sent messengers to guide us positively with empirical data to aid some better informed ethical balancing between the mandates in early Genesis to fill the earth and to care for it.¹²

Suffering a pain is distress about strong sensations that appear to come from a part of the body. We all know what being in pain feels like, how it looks in others and what to do about it. It is now a scientific truism that this normal pain system exists because of the inclusive fitness in individuals and their relations getting away from acute physical danger when there is not more to be gained for their successors by enduring it (as maybe in battle). Life without pain has usually been short or disabled. Thus we can glory in God's larger purposes when the individual's pain is part of the species' functional adaptation to the ecology.

Explicitly theological approaches to the problem of suffering may also be developed from a scientifically realistic and biblically sound theism that allows for aeons of life on earth and the continuity of creation and providence. As Jesus pointed out, God sends rain on the just and the unjust. It becomes possible to see that Genesis may be teaching similarly that God creates and provides everyone with other things that also can be good and can be bad. This view could be taken of the unwanted plants that grow alongside the food crops, once we recognise that, in all probability, human settlements became too large to feed without domesticated crops and animals less than 10,000 years ago, and indeed oral history may not extend appreciably further back than that. The difficulties that women have giving birth may also be part of the Creator's provision of the large brain and yet helpless infancy needed to develop the intellectual and social abilities required to love our Maker and each other in a human way. If so, it follows that the evil in such suffering is in the way that men and women treat God's creation after we have rebelled against him, and is not inherent in the toil of weeding or the pains of childbirth that were always part of what God makes and regards as good (Gen. 1:26-31). It becomes apparent that sin has blinded us to opportunities to glorify God and to rejoice in the wisdom and love shown in these parts of the creation. Both sorts of labour are a joy to those attuned to God's purposes – the joy of giving new life, either to plants that will feed not just the farmer but the community, or to another human being to nurture, to educate and to let go lovingly into adulthood.

12. R.J. Berry (ed.), 2000, *The Care of Creation*. Nottingham: IVP

The O.T. psalmists often cried out to God in dire distress (e.g. Ps 102) and yet they also wrote, “Shout for joy to the Lord, all the earth... Know that the Lord is God. It is he who has made us, and we are his;... the Lord is good and his love endures for ever; his faithfulness continues through all generations” (Ps 100: 1, 3, 5). When the serpent bruised the heel of the woman’s seed, and God in man underwent the ultimate in suffering, Jesus did not just accept it as God’s will but he died with a cry of triumph.

The Creator’s systems

To those who have learnt to read the Book of Nature as a whole pattern of specific details, it is quite plain that we live on a fragile planet that is ancient beyond ordinary comparison with the tens of centuries of human history – many millions of centuries of oceans and land. The evidence from fossils and artefacts discovered in recent decades is that the earth has been inhabited by hominids for a few million years. The residues of their behaviour for 100,000 years or more are hard to distinguish from those of contemporary hunting and gathering nomadic peoples. In contrast, signs of agriculture and village-like settlements become very tenuous more than 7-10,000 years back from the present. Some oral tradition from these more recent times of human community might conceivably be reflected in the inspired writing that has left us with the early chapters of Genesis.

Might this evidence that urban “civilisation” was (pro)created only a few millennia before Abraham, Isaac, Ishmael and Moses, expose some worldliness that has infected the evangelical tradition from modern Western individualism? The evidence is that a larger human community than the nuclear family was first created and that this complexity and proximity of living was necessary to the coordinated appearance of distinctively human communication, cooperation, brains, bodies and social cultures. Might not this life in relatively large communities have been God’s way of giving its individual members, Adam and Eve, the capacity to converse with their heavenly Father after a day’s work among the animals and plants – and the freedom to be faithless to the Creator’s purposes and so to turn the labour of weeding, the pain of childbirth and the process of dying from created glory into sinful misery? Our scientific understanding of creation is impoverished if we consider only the physicochemical entities who are members of a species and neglect the now fast-growing insights and powers arising from research into communal processes.

Conclusion

A fully biblical theism can acknowledge the scientific strength of the main lines of theoretical interpretation of the evidence from current molecular and organismic biology by recognised experts in those fields. This is how God is creating and sustaining human life on earth right now. The evidence from paleontology and cosmology is that God has been creating and sustaining life on earth by

such systems for hundreds of millions of years. Biblical scholars down the centuries have been clear that the Genesis creation accounts teach no science. It therefore can only be a terribly uninformed modernist anomaly to read them now as contradicting physics and biochemistry (as Marston and Forster emphasise) and (as I must add) organismic biology, the range of psychology and the ecological and social sciences as well.

However flawed by rejection of the Creator's love, humanity remains the embodied image of God, who is the intimately communing and unreservedly outgoing Father, Son and Spirit. Creation cannot be lifeless or mindless, nor asocial either.

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PAUL MARSTON

Response to Booth

I am grateful for the positive endorsement that David Booth makes of the bulk of our work in *Reason, Science and Faith*, and share his view that we are part of a consensus on scientific issues that is extensive though not total. With most of his 1998 S&CB article on human nature I can agree. In general those associated with this journal share the view that modern science and biblical faith can be in fundamental harmony. This response, like his critique, is not intended negatively, but as a contribution to the rightful ongoing discussion.

As he begins his actual critique, Booth focuses in on our statement that Henry Morris (who effectively founded young-earth creationism as a force in mainstream evangelicalism) brings an “engineer’s approach to understanding Scripture”. He seems, however, to be reading into it much more than we intended.

Actually this description of Morris was given me over a decade ago by the President of an American college with whom I was to share teaching in a summer semester, and it seemed apt at a certain level. We were thinking of the term “engineering” in terms of Morris’s background in 1950’s hydraulics, not, for example, in terms of more recent “systems engineering” or “software engineering”. Perhaps, as Booth suggests, the term may even become expanded in the 21st century to include physiology, psychology, and sociology (not to mention “many of the founders of modern science”). But Henry Morris was not a physiologist, psychologist or sociologist (or a founder of modern science), so the thought of implicating such groups was not in our minds.

This is not, of course, about levels of complexity. The fact that the engineering profession is built on “theoretically, conceptually and mathematically sophisticated applications of physics to human constructions” was not in dispute, any more than the honourable election to FRS of engineers (hydraulics or otherwise) who are far cleverer than us. The historical tendency in England to equate engineers with mechanics is to be deplored, and if our comments inadvertently gave any credence to such a notion I am truly sorry and thank David Booth for this opportunity to apologise. But even the second and quite critical comment Booth quotes from us is *specifically* referring to Morris’s approach to *language use*. In general, surely, 1950’s hydraulics engineering did not involve an understanding of the difficulties of identifying and analysing analogical language in metaphysics or theology – however complex might have been its applied mathematics and physics?

My university teaching includes undergraduate modules entitled “Christianity, Science and History” and “The Nature of Science”, which are taken by students from many different areas of study. To many science and engineering students, linguistic and metaphysical analyses use ideas and language very differently from their core subjects. Mechanical engineers, in my experience, are amongst those finding adjustment the hardest. Some, of course, are very successful in making this adjustment, and I am sure that academic engineers at a higher level (as in most groups) must vary enormously in their individual abilities to handle the different linguistic processes involved in exegesis. But the differences between language use in exegesis as against in certain levels of technology (however mathematically complex the latter) seem to me real nevertheless.

Morris, unfortunately, approached theological language (which is often analogical) as though it were the purely literal language found in some aspects of technology. Precisely because he was an intelligent man, of course, he was totally unable to carry this through consistently in practice, and we identified in his *The Genesis Record* many metaphorical interpretations of parts of Genesis 1-3. His failure, however, to explicitly recognise such aspects of linguistic use, has led to much confusion in the church. To assert this was not meant to be any general slur on “engineers” (however defined), and if it seemed like this then I regret the way it was expressed.

A rather more substantive point is whether engineering concepts like “control theory” can be usefully transferred from engineering to psychology. This is part of a wider debate that goes back to the “mechanical philosophy” and beyond. We would support much that David Booth says about this. The ideas of the body and brain functioning as mechanisms have been obviously useful, although the emergence of higher order properties are now generally recognised (as Booth asserts) to be unpredictable from the basic atomic laws that underlie them. In this sense David Booth, Roger Forster and myself, all oppose “reductionism”.

In fact, we can identify a number of things the difference between us is *not*:

- It is *not* about the “possession” of “a soul” or “soul substance”. This is not a way any of us would express it.
- It is *not* about whether emerging higher-order physical properties could be humanly predicted from lower order (atomic) ones, nor about any supposition that ultimately particle physics might become the only useful science to which all others can be “reduced”. Like Booth, we recognise that “physiology and ecology are beyond physics”, none of us are “reductionists” in this sense.
- It is *not* about whether at sub atomic levels, detectable deviations from scientific laws occur in the brain. We are not committed to any such view.
- It is *not* about any supposition that *every* human decision is “free” and therefore totally unpredictable. Booth’s 1998 article cites Wolf that there are “developmental preconditions of freedom of choice through reasons rooted in earlier habits of action”. Were this not true then “conversion” would be meaningless, and even secular existentialist Jean Paul Sartre spoke of “the original choice” (*Baudelaire*) and “the fundamental act of freedom” which is constantly reaffirmed by “choice of myself in the world” unless there is a “radical conversion” (*L’Etre et le néant*). Belief in freewill of spontaneity is not belief in *total* unpredictability.
- It is *not* about whether “determinate information transmission can occur” within the brain. If it could not, then organised thought or decision-making would be impossible as everything would be totally unpredictable.
- It is *not* about any desire on our part to equate human purpose with “chance” events in the sense of “unintended”. Application of the uncertainty principle in this context has no such implication.

The critical issue on which we diverge seems to be macro-determinism. In a Cartesian purely mechanistic world (minus Descartes’ own dualistic spirit-substance in which Booth clearly disbelieves), its total state at time t predetermines its state at time $t+n$. Today, however, it is generally agreed that, at quantum level, physical reality is *unpredictable*: its state at time t does not uniquely determine its state at $t+n$. There are then two possibilities regarding higher order levels:

(A): Macro-determinism: Since very large numbers of subatomic reactions are involved in macro-level phenomena, the latter are predictable to a very high degree of certainty. Uncertainty fluctuations form merely an ineffectual background “noise”.

(B): Openness: Chaos theory implies that “tiny” initial differences can sometimes make large differences to final outcomes. If “tiny” in some contexts means subatomic (or if, as Polkinghorne seems to emphasize, sub-atomics sometimes act holistically¹) there may also be openness (or unpredictability) in

1. See J. Polkinghorne in *Science & Christian Belief*: p. 104, 1995.

some macro systems.

Clearly “tiny” in the context of the chaos theory of weather or of lottery devices does *not* mean sub-atomic, but we (and others) suggest it may do in instances of some human decision making. Booth certainly attacks this idea as “misconceived”, and seems to be espousing (A) above.

Ultimately, whether or not the human brain *is* fully predictable *is* a scientific rather than a metaphysical question – though whether we will ever reach a point of genuinely being able to decide is (as Stephen Hawking has commented on the present situation²) questionable. But though the science of brain structures are relevant to them, issues of the mind and consciousness do also seem to me to involve philosophy and metaphysics and cannot simply, as Booth seems to wish, be written off as philosophical pseudo-problems now finally exploded by advanced engineering. At the very least, however, I believe David Booth would be premature in any simple assertion that the brain macro-determinism issue is already effectively decided.

On the philosophical level, moreover, there are two main questions with such a determinism: could it leave room for either human freewill or divine action?

Booth states that freewill: “is deciding – and acting – for one’s own reasons (good or bad) rather than under the sway of non-rational factors, let alone being forced by external constraints.” His footnote references his 1998 article, though this contains little discussion of freewill and seems to cite only Susan Wolf. It sounds, however, much like “compatibilism”, which essentially redefines “freewill” as “absence of *external* compulsion” (though Booth seems to want to add absence of *irrational* compulsion as well which in my experience probably makes *most* decisions unfree!). Many philosophers, however, believe compatibilism to be a total negation of any real or traditional meaning of the term “freewill”.³ In a theistic context compatibilism is particularly incoherent. It seems to imply that peoples’ decisions (eg whether or not to respond to the gospel) are totally determined and predictable (given enough knowledge) from physical environment and physiology. Indeed, one presumes that eg Adam’s decision to take the fruit was predictably determined by environment and physiology (certainly not by external constraint though whether by “irrationality” I cannot say). So *why* did God make him and his world like this – effectively pre-programmed to introduce sin? A bit better piece of initial engineering would have preserved compatibilist freewill but ensured a sin-free creation and saved a lot of hassle. Theistic compatibilism seems to present a God who is a *failed* engineer. The classic “freewill defence” for the existence of evil is negated because God *could* have given compatibilist freewill but engineered the human machine and its environment better and sin-free.

2. See *Reason, Science and Faith* p. 92 etc for contextual references to Hawking’s Black Holes and Baby Universes (1993).

3. See *Reason, Science and Faith* pp. 80ff and eg Peter Van Inwagen An Essay on Freewill.

The late Donald MacKay (who seems to be a mentor of Booth's) never answered this basic question about his hypothetical deterministic system. His use of Planck's logical indeterminacy may or may not answer issues of human "fatalism"⁴, but it leaves God as either a failed engineer or someone who intended all the evil in the world. There is, of course, an Augustinian theological system (espoused today eg by Paul Helm) that assumes precisely that all events (including evil ones) *are* determined by the will of God. Roger Forster and myself have long argued the enormous biblical objections to any such theology, and a complete rewrite of our early theological work on this, *God's Strategy in Human History*, has recently come out in the USA⁵. The biblical God clearly often does not get what he wants in individual events in our world, as reflected in the sin (which he finds abhorrent) in each of our lives.

A concept of emerging properties or systems-level pluralism seems to me to give no answer to the issue of determinism and human sin. Note that this is *not* a question of whether we could predict *a priori* the emergent higher-level properties of the system given only knowledge of the atomic movements. Unless God was actually *surprised* at the nature of the emerging properties (which surely would be an idea anathema to MacKay?) *God* would surely know which atomic patterns would result in what macro effects in higher order systems? If the behaviour of the whole organism is *not* predictable *in principle* (and therefore by God) from the behaviour of the sum of its constituent atoms, then *why not* (if chaos theory is deemed irrelevant)? And if it is predictable, then *why* did God start the materials off in the way he did in the first place? A bit better engineering job would have given a sin-free world. Nor can there be recourse to the fact that the organism is inter-reacting with a complex environment on the basis of situations arrived at through previous complex interactions. The sheer *complexity* of it all would not remove its determinism or its total predictability to an omniscient God as he arranged its starting point. Deism or even some forms of theism might be logically compatible with pure determinism and compatibilism, but not the people-loving and sin-hating God of the Bible.

I cannot really understand (and so make no comment on) the paragraph in which David Booth suggests that in our book we neglect "the whole Bible's focus on human motivation, intellect, physicality and sociality" (p.151) and why this puts us at peril of deism.

So we come to the second issue: divine action. Booth presents the "biblical" view as "a fathering God in continuous interaction with a loved creation..." What he does not tell us is on what level this "interaction" operates physically. Does it change the motion of any single atom in the universe? A pantheist could perhaps believe that God *was* the atoms, and that *everything* that happened

4. See *Reason, Science and Faith* pp.87ff, and also the article by J. Doye et al in *Science & Christian Belief* 7: 117-140, 1995.

5. *God's Strategy in Human History* (Wipf & Stock, 2000, ISBN 1-57910-273-5)

was therefore divinely determined. But the biblical God seems to be one who not only *sustains* the universe in a general sense, but also *acts* in *particular* ways: “The Lord has done this!” would be a pointless thing to say (“marvellous in our eyes” – as in Matt 21:42 – or not) if in fact he does *everything*. We would not be able coherently to thank God for “making bare his holy arm” for us on some occasion, since everything and anything which happened to us would be his direct action. All we could do would be to remark that it was marvellous if what he did to and for us on one occasion happened to be to our taste. Quite a lot of what Scripture says about God taking action would have to be “anthropomorphed” into some kind of universal theological determinism, and we would be left with a theology quite different from the biblical God who *acts*. How then *can* a theistic God be said to *act* in a *particular* way in a physically monistic universe that, on any macro level, is deterministic (albeit complex and requiring his sustaining power)? In our book we raised this issue concerning Arthur Peacocke’s theologically liberal physicalism (which in theory is “open” rather than deterministic). We raised it concerning Warren Brown and Nancey Murphy’s evangelical “non-reductive physicalism” and “top-down causality”. The same question is relevant to Booth’s world of apparently macro-deterministic but systems-level pluralism. *How*, for example, does God (as Booth says) “intervene” from outside by the Holy Spirit? Does the Holy Spirit move any of the atoms from their otherwise predictable courses of interaction? Can neuroscientists detect this? Or is our experience of the Holy Spirit mediated by something non-physical? Or is the term “Holy Spirit” just another term for a particular systems-level of atomic operation that is physical, deterministic and only metaphorically “outside”?

I do not personally think it useful in this context for Christians to accuse each other of “deism” or “pantheism”. Clearly David Booth, Roger Forster, Donald MacKay, Paul Marston, and Nancey Murphy, are all Christian theists in the sense of believing that the universe continues to exist only because God so wills and sustains it – and Henry Morris asserted the same when I asked him. But there is a distinction between maintaining the universe and determining (through either theological or physical determinism) all the events that happen in it. All forms of monistic physical determinism (whether dubbed “non-reductive physicalism” or “systems-levels pluralism”) seem to suffer from these two basic problems outlined above:

- (i) they imply either a God who intended evil, or a God who is a failed engineer.
- (ii) they seem to leave no room for a God who *acts* in particular ways in his world.

Finally, are David Booth (and Donald Mackay and Arthur Peacocke who says the same thing) right to claim that the *only* form of biblical ontological dualism is that between God and the world? One problem with this (for non-liberal theologians) is the reality of angels and “spiritual hosts of wickedness in the heavens”. Secondly, how are we (unlike animals) in the “image” of God if the fundamental and *only* divide is between him and the creation? Jesus seems (eg in

John 3 and 4) to adopt some kind of spiritual/physical dualism, and proclaims God is Spirit. So how can the dead be raised with a “spiritual body” if there are only two kinds of reality – God and the physical? I can understand “aspect dualism” (which in a sense sees the mind as a property of matter manifested at a certain systems-level, but sharply distinguishes the “I-story” and “O-story” as different in kind). But to call even this “non-physicalist *monism*” seems odd and unhelpful. There must be *some* sense in which the “image of God” in us makes us ontologically different from animals and the inorganic world. There is, of course, a sense in which Berkeley’s monistic idealism is a form of “non-physicalist monism”, but this brings its own problems and in any case is obviously not what Booth means. I can presently see no way in which the term “monism” can usefully be applied in a Christian theistic context to the created world.

One of the problems with essay reviews (and replies to them) is that they can give negative impressions. It has been my pleasure in the past to enjoy Christian fellowship with many determinists/physicalists including Donald Mackay, David Booth, and Nancey Murphy (not to mention theological determinists like Paul Helm) – and as I see it we are all fighting on the same side. There are a few family disagreements, but if David Booth ever has time (which active research seldom leaves anyone nowadays!) to write a “big book”, I am sure that I will find much to agree with in it. All our views on tendentious issues have, inevitably, to be tentative, and whatever is put forward will need developing, discussing, and improving. The evangelical community need to do this – though the real engagement on the level of ideas must be with the forces of secular anti-theism. Jointly we should aim together to demolish arguments and every pretension that sets itself up against knowledge of God, and take captive every thought to make it obedient to Christ.

NANCEY MURPHY

Response to Cullen

I want to thank Revd Lindsay Cullen for the fine summary and careful critique of my book *Beyond Liberalism and Fundamentalism* (Trinity Press, 1996).¹ I could only wish that he had invested his philosophical knowledge and critical skills on a more *worthy* object. *BLF* is one of my few attempts at a popular-level book; it began as a series of public lectures at Rice University in 1994. I have written a number of scholarly pieces that deal with many of the same topics, references to many of which are in the footnotes in *BLF*. I shall mention some of them in what follows.

Cullen claims that my methodology is flawed, in that (1) my scientific

¹ *Science & Christian Belief* 13:39-50, 2001

defense of a nonreductive view is 'shallow and unpersuasive', and (2) my use of the philosophical concept of supervenience is 'both eccentric and unhelpful' (abstract). I shall briefly address both of these charges.

I believe that the issue of reductionism is one of the most important philosophical topics of the present generation. Reductionist assumptions occur in all contemporary discussions of sociobiology, genetics, neuroscience. I want to emphasize the term 'assumption' since there is no reason why anti-reductionists should bear the burden of proof rather than the reductionists—except that this has been the prevailing view since the dawn of modernity. There have been attempts to formulate nonreductive accounts of nature since early in the twentieth century. (See my *Anglo-American Postmodernity: Philosophical Perspectives on Science, Religion, and Ethics*, Westview Press, 1997, chapters 1 and 10 for some of this history.) In philosophical circles, 'reductionist' has lately become something of a reproach, yet I believe that no one (including myself!) has provided a satisfactory philosophical explication of how reductionism is to be avoided—despite the fact that many scientists and philosophers are convinced that reductionism is only a partial truth. Cosmologist George F.R. Ellis and I have attempted to contribute pieces toward a solution to the problem in *On the Moral Nature of the Universe: Theology, Cosmology, and Ethics*, Fortress, 1996 (see especially chapter 2). We attempted there to extend the substantial contributions to this topic by Arthur Peacocke.

I had the luxury of extended conversations on the topic of reduction and downward causation with philosopher of mind Theo Meyering, neuropsychologist Warren Brown, and philosophical theologian Mark Richardson during my tenure as the J.K. Russell Fellow at The Center for Theology and the Natural Sciences in the spring of 1999. (Essays produced there are published in the *CTNS Bulletin*, 19, no. 1, Winter, 1999.) Yet this is very much work still in progress. Brown and I have been engaged in study of this issue ever since, and plan to complete a manuscript this year with the ambitious hope that it will in fact provide a satisfactory account of top-down causation and thereby solve the problem of causal reductionism. (Our tentative title is *An Essay in Neurophilosophy: Neuroscience and Moral Responsibility*.)

In the previous sentence I indicated that I believe an adequate account of top-down causation is the key to defeating causal reductionism. At the time of writing *BLF* (and of my contribution to W.S. Brown, et al., eds. *Whatever Happened to the Soul? Scientific and Theological Portraits of Human Nature*, Fortress, 1998) I believed that a proper understanding of supervenience would solve the problem of reductionism. I have now come to see that this is not the case. However, the concept of supervenience is something we need for this and a number of other intellectual uses. I stand by my 'eccentric' definition, in opposition to the standard sorts of definition proposed by Jaegwon Kim and others, since Kim himself now recognizes that reductionism follows from his definition. (See my 'Supervenience and the Downward Efficacy of the Mental', in R.J. Russell, et al., eds. *Neuroscience and the Person: Scientific Perspectives on*

Divine Action, Vatican Observatory, 1999; Kim's statement is in 'The Myth of Nonreductive Materialism', in *The Mind-Body Problem*, R. Warren and T. Szubka, eds., Blackwell, 1994.)

The judgment of 'unpersuasive' is an appropriate kind of criticism to level against the definition of a relatively new technical term. That is, knowledge of customary use fixes the definition of ordinary language, but in philosophy, definitions are offered as *proposals* for both the meaning and the use of a technical term. I have proposed that a supervenient property should be thought to be determined not only by subvenient properties but also by the circumstances in which the owner of those properties finds itself or herself. My proposal for a definition of 'supervenience' in fact depends on the success of explicating top-down or whole-part causation and of locating persuasive instances of it, because doing so will show that the supervenient property is (sometimes) dependent on those higher-level circumstances. So only time will tell whether my definition is of value.

I am grateful to the editors of this journal for the opportunity to provide this response, particularly so that I might disclaim any pretensions on my part to have solved these very difficult issues, either in *BLF* or in my subsequent writings.

Correspondence

Supervenience and causality – A medical response

Lindsay Cullen in his recent article¹ seems to question top-down causation. I think it is time it is recognized as an observed fact. Top-down causation is central to the science of psycho-somatics, but even in the simple examples the author himself cites, there is top-down causation. In gas laws the pressure is applied to the system from the outside, the volume as a whole changes and the temperature is raised or lowered again from the outside and to the system as a whole. Even the car engine example, while the correct movements of each component may be a necessary cause to keep the engine running, the reason the engine starts is because a person turns the ignition. Top-down action, along with the correct interactions of the component part, is the sufficient cause for the functioning engine. Indeed a person fashions and shapes the parts of an engine together and then applies energy from the outside.

1 Cullen L. 'Nancey Murphy, Supervenience and Causality'. *Science & Christian Belief* 13:39-50, 2001.